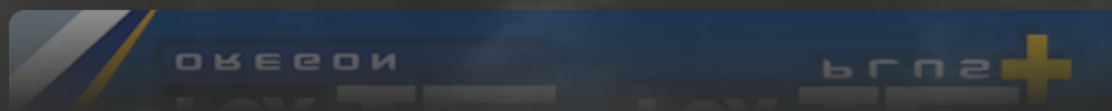


# WINTER 2022-2023

Mark Nelsen

HOW DO YOU SUMMARIZE THIS WINTER?





# WINTER 2022-2023

via ChatGPT



What kind of winter did Portland, Oregon see this year?



As an AI language model, I don't have access to real-time information, but I can tell you that   Portland, Oregon typically experiences mild winters with cool temperatures and precipitation. The average temperature in Portland during winter is around 45 degrees Fahrenheit (7 degrees Celsius) and the city receives about 6 inches (15 cm) of snowfall per year on average. However, it is possible that specific winter conditions can vary from year to year.

# WINTER 2022-2023

Mark Nelsen


A TYPICAL PACNW LA NINA WINTER



# Winter 2022-23

- Other than late February snowstorm, nothing all that memorable really sticks out
- 8<sup>th</sup> consecutive winter with snow at PDX
- PDX finally dropped below 20, first time in 5 winters!
- Still waiting for regional arctic blast. 9th consecutive winter without a widespread arctic outbreak.  
(December 2013 was the last)





Some  
pre-Christmas  
ice skating  
in Silverton

**OFFICIAL SNOW TOTAL: 11.0"**

at PQR (NWS Office)

**7.8"** Downtown (KGW-TV)

# **FIRST ALERT** PORTLAND SNOWFALL

WINTER 2022-23



**11.0**  
inches

WINTER  
SNOWFALL

## 3 measurable snow events

SNOW	FRZ RAIN/ICE
0.1" Dec 4th	.54" Dec 23rd
0.1" Dec 22nd	.32" Dec 24th
10.8" Feb. 22nd	
TRACE recorded on 10 additional days	

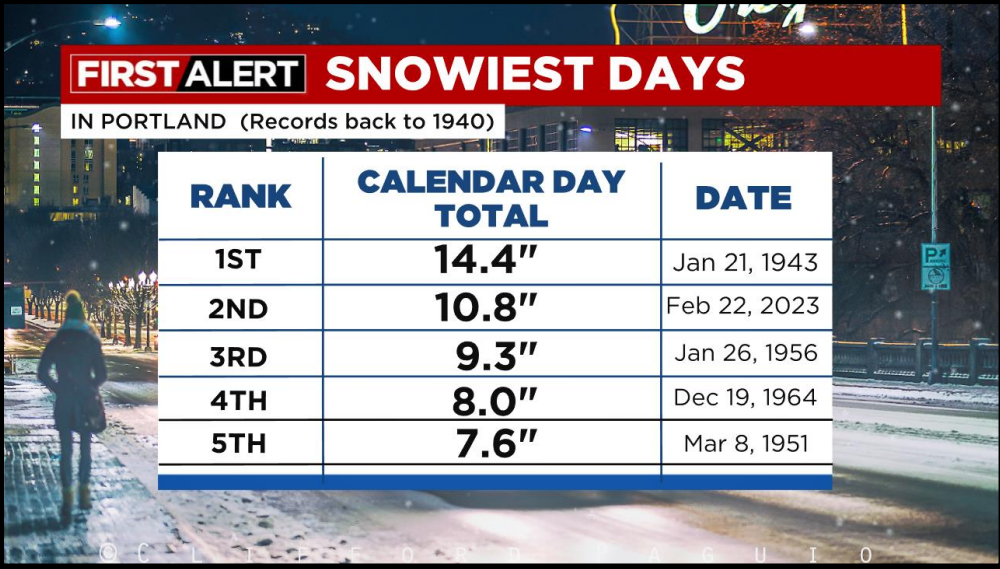
# A WEATHER QUIZ

IN WHICH MONTH DID STEVE PIERCE'S HOME  
(Salmon Creek)  
GET THE MOST SNOW IN ONE DAY?

- A) January 2017
- B) February 2021
- C) February 2023

**EXTRA CREDIT**

HOW DOES THAT DIFFER FROM OFFICIAL PORTLAND OBS?



<b>FIRST ALERT SNOWIEST DAYS</b>		
IN PORTLAND (Records back to 1940)		
<b>RANK</b>	<b>CALENDAR DAY TOTAL</b>	<b>DATE</b>
1ST	14.4"	Jan 21, 1943
2ND	10.8"	Feb 22, 2023
3RD	9.3"	Jan 26, 1956
4TH	8.0"	Dec 19, 1964
5TH	7.6"	Mar 8, 1951

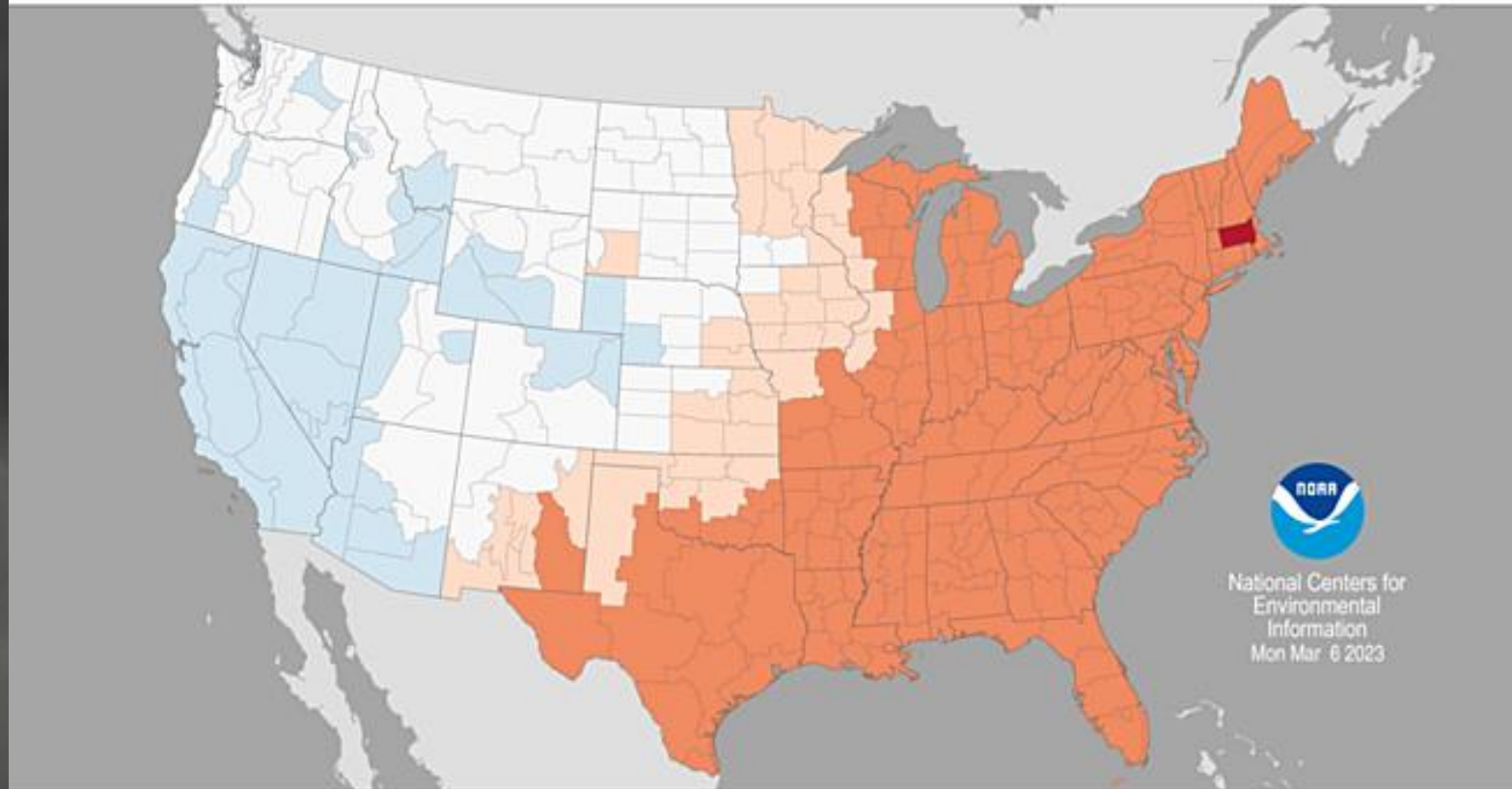


# Winter Temperature Anomaly

## Divisional Average Temperature Ranks

December 2022–February 2023

Period: 1895–2023



National Centers for  
Environmental  
Information  
Mon Mar 6 2023

Record  
Coldest

Much  
Below  
Average

Below  
Average

Near  
Average

Above  
Average

Much  
Above  
Average

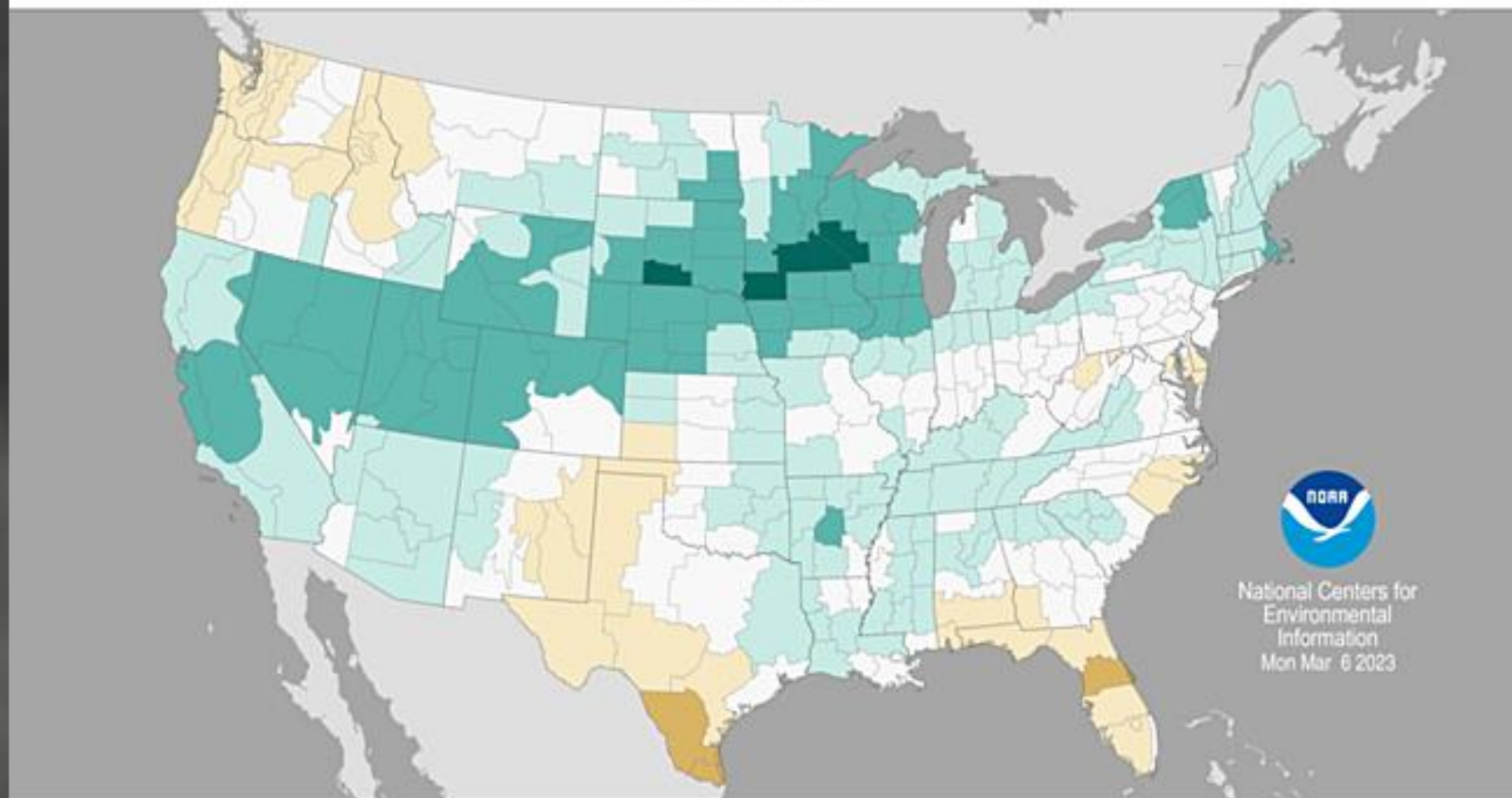
Record  
Warmest

# Winter Precip Anomaly

## Divisional Precipitation Ranks

December 2022–February 2023

Period: 1895–2023



National Centers for  
Environmental  
Information  
Mon Mar 6 2023



Record  
Driest



Much  
Below  
Average



Below  
Average



Near  
Average



Above  
Average



Much  
Above  
Average



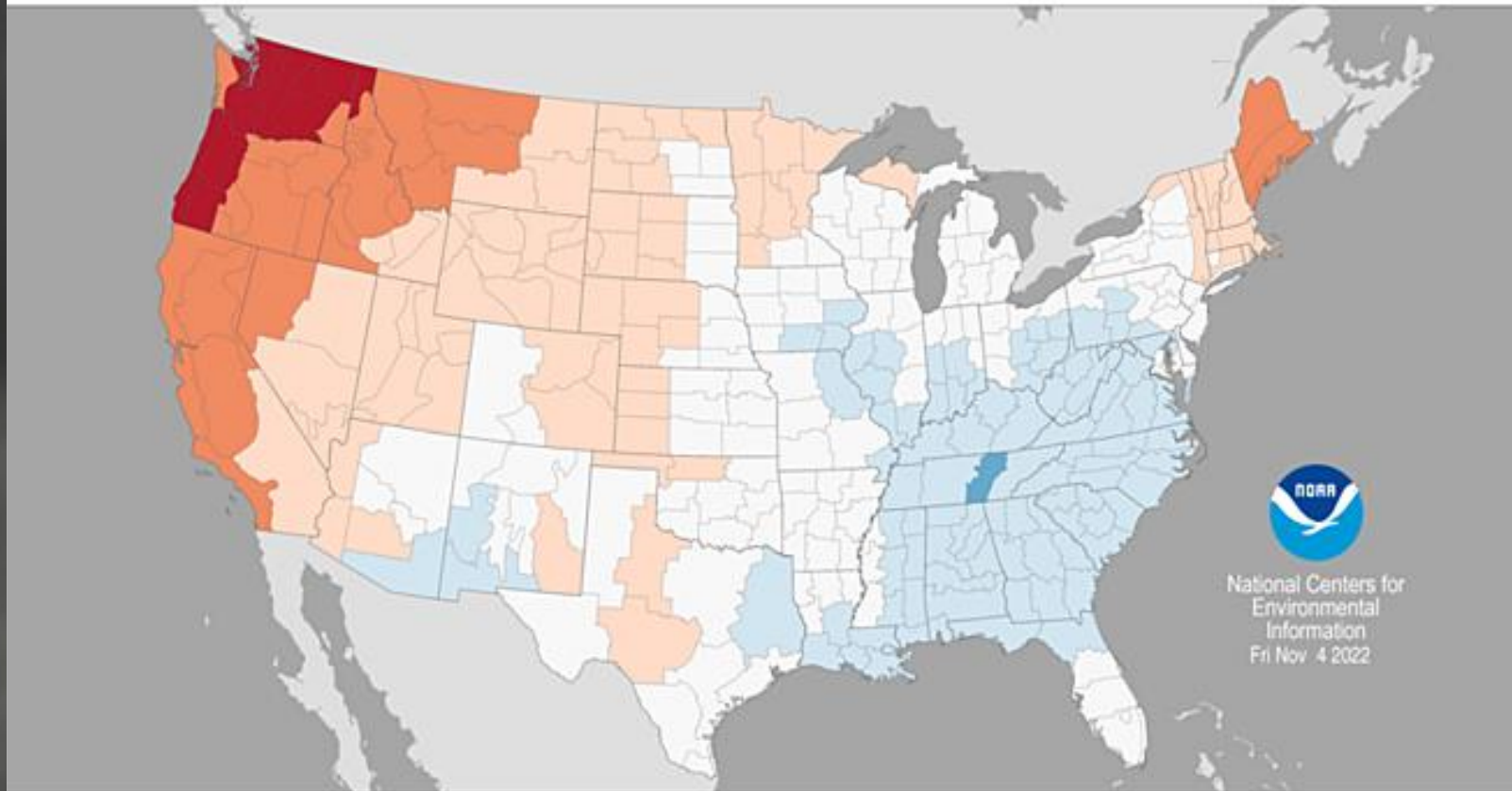
Record  
Wettest

# THE USA VIEW

## Divisional Average Temperature Ranks

October 2022

Period: 1895–2022



National Centers for  
Environmental  
Information  
Fri Nov 4 2022

Record  
Coldest

Much  
Below  
Average

Below  
Average

Near  
Average

Above  
Average

Much  
Above  
Average

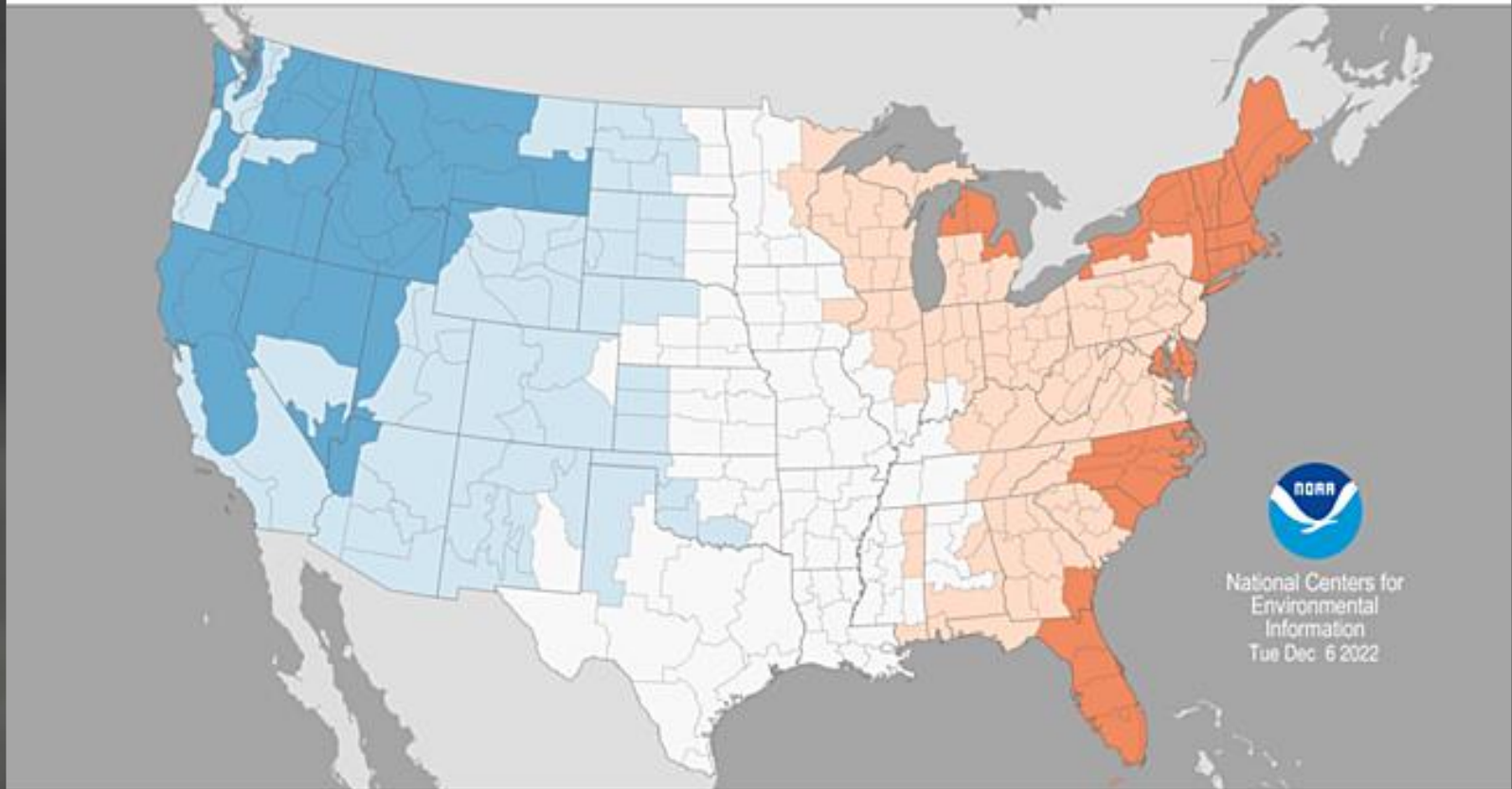
Record  
Warmest

# THE USA VIEW

## Divisional Average Temperature Ranks

November 2022

Period: 1895-2022



National Centers for  
Environmental  
Information  
Tue Dec 6 2022

Record  
Coldest

Much  
Below  
Average

Below  
Average

Near  
Average

Above  
Average

Much  
Above  
Average

Record  
Warmest

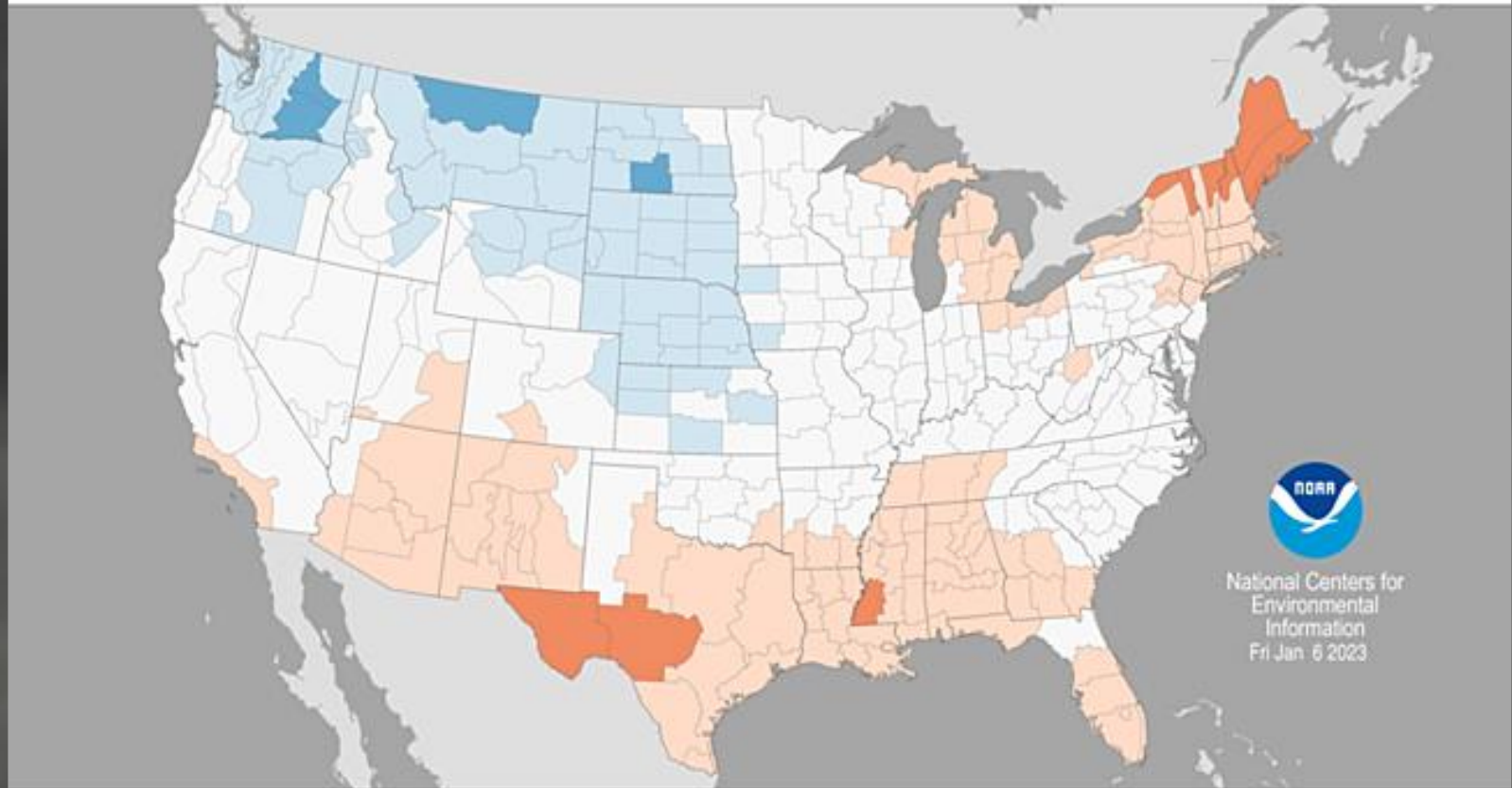


# THE USA VIEW

## Divisional Average Temperature Ranks

December 2022

Period: 1895-2022



National Centers for  
Environmental  
Information  
Fri Jan 6 2023

Record  
Coldest

Much  
Below  
Average

Below  
Average

Near  
Average

Above  
Average

Much  
Above  
Average

Record  
Warmest

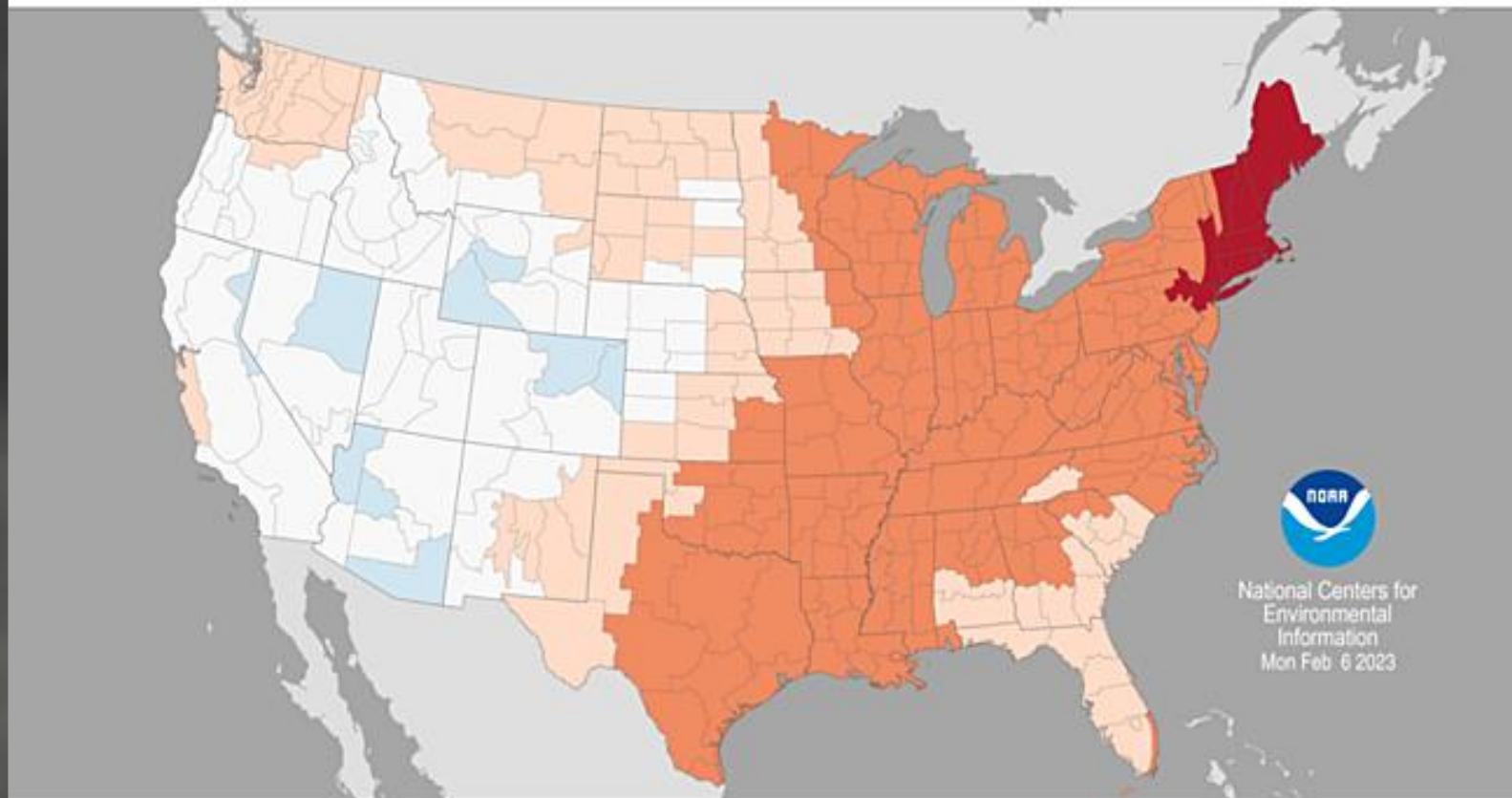


# THE USA VIEW

## Divisional Average Temperature Ranks

January 2023

Period: 1895-2023



National Centers for  
Environmental  
Information  
Mon Feb 6 2023

Record  
Coldest

Much  
Below  
Average

Below  
Average

Near  
Average

Above  
Average

Much  
Above  
Average

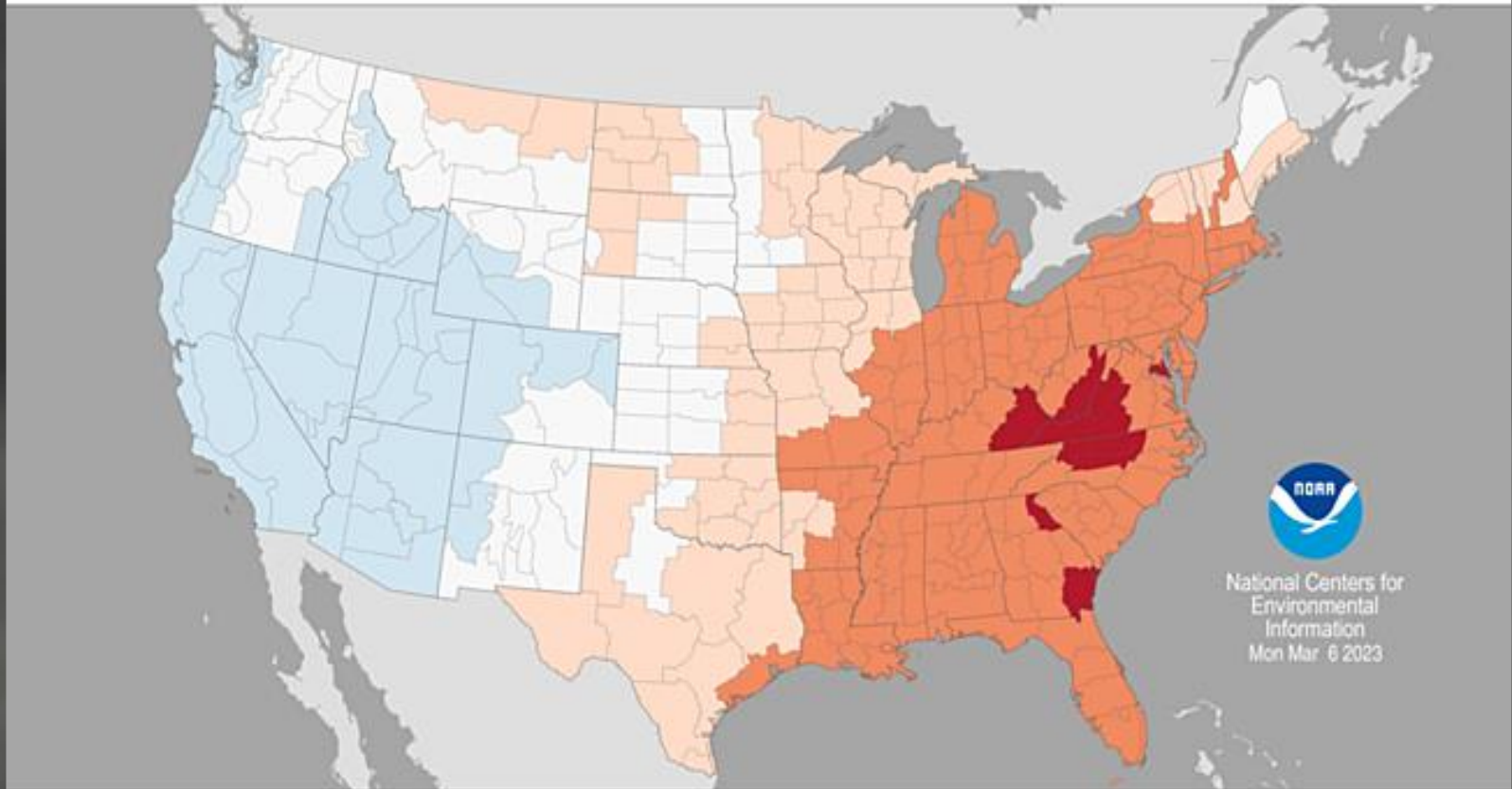
Record  
Warmest

# THE USA VIEW

## Divisional Average Temperature Ranks

February 2023

Period: 1895-2023



National Centers for  
Environmental  
Information  
Mon Mar 6 2023

Record  
Coldest

Much  
Below  
Average

Below  
Average

Near  
Average

Above  
Average

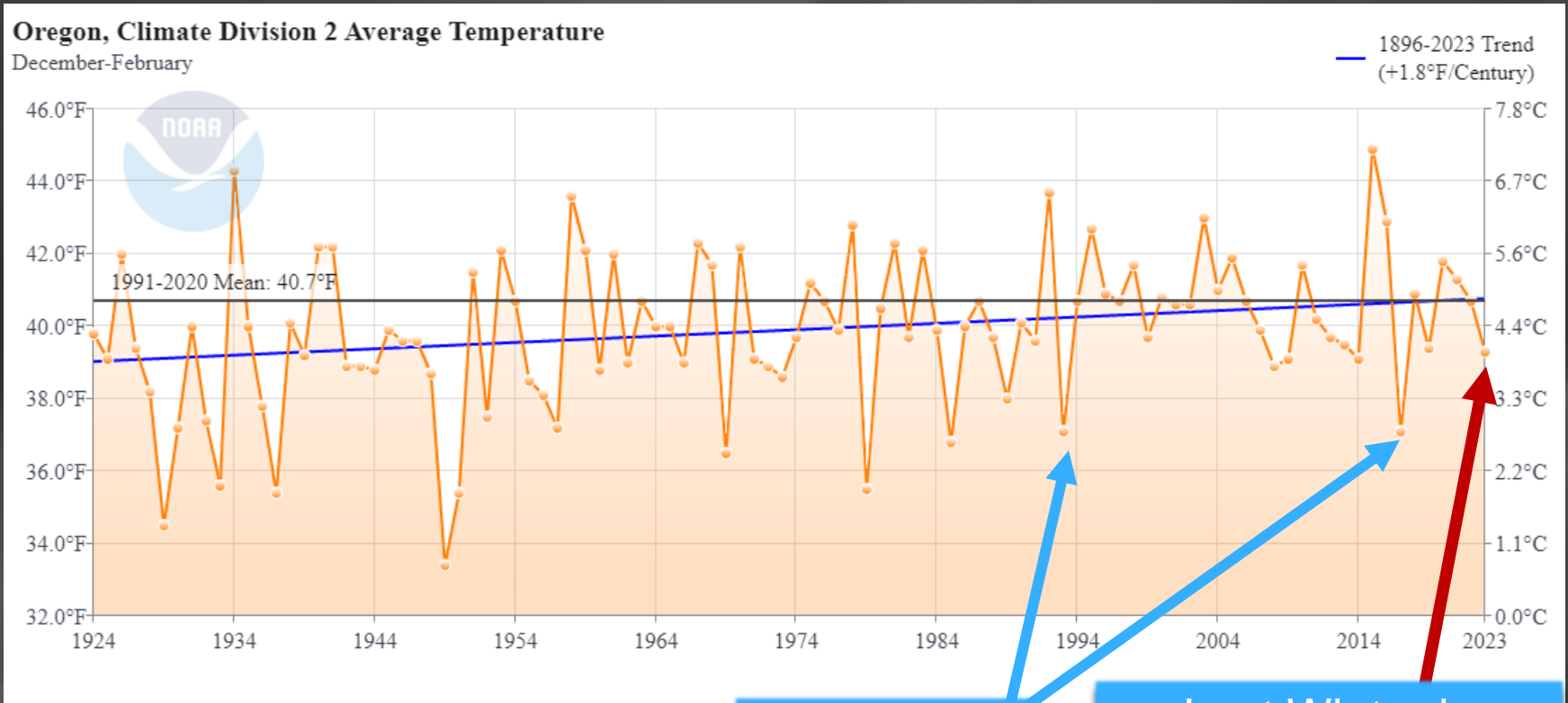
Much  
Above  
Average

Record  
Warmest

# OR Western Valleys Winter Temperature

*(the past 100 years)*

Cooler in 4 years. Last “very cold” winter was 2016-17



The last two  
cold winters  
(92-93 & 16-17)

Last Winter in  
Oregon Zone 2  
(Willamette Valley)

# Oregon Winter Temps

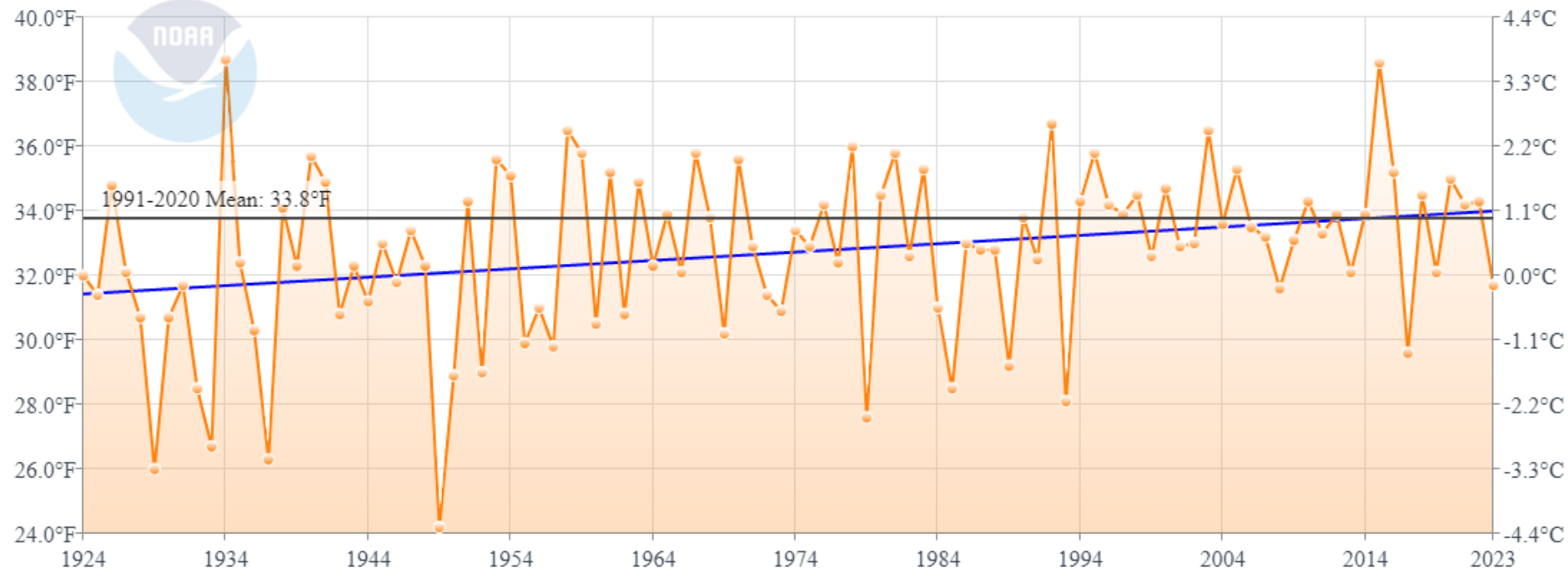
(the last 100 years)

*Slow Warming Trend*

## Oregon Average Temperature

December-February

1896-2023 Trend  
(+2.6°F/Century)





# NOVEMBER 2022

A cool month!, but uneventful

## FIRST ALERT NOVEMBER 2022 IN PORTLAND

SUN	MON	TUE	WED	THU	FRI	SAT
		1 53°	2 49°	3 49°	4 60°	5 56°
6 49°	7 45°	8 52°	9 50°	10 52°	11 49°	12 53°
13 47°	14 56°	15 54°	16 47°	17 48°	18 50°	19 47°
20 47°	21 46°	22 53°	23 47°	24 56°	25 44°	26 48°
27 47°	28 48°	29 47°	30 49°			

**-3.4°**  
from normal  
**COOLEST**  
**NOVEMBER**  
**IN 22 YEARS!**

# FIRST ALERT NOVEMBER 2022 IN PORTLAND

SUN	MON	TUE	WED	THU	FRI	SAT
		1 .17"	2 .05"	3 .07"	4 1.87"	5 .03"
6 .67"	7 .12"	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22 .31"	23	24	25 .39"	26
27 .40"	28 .01"	29 .19"	30 .89"			

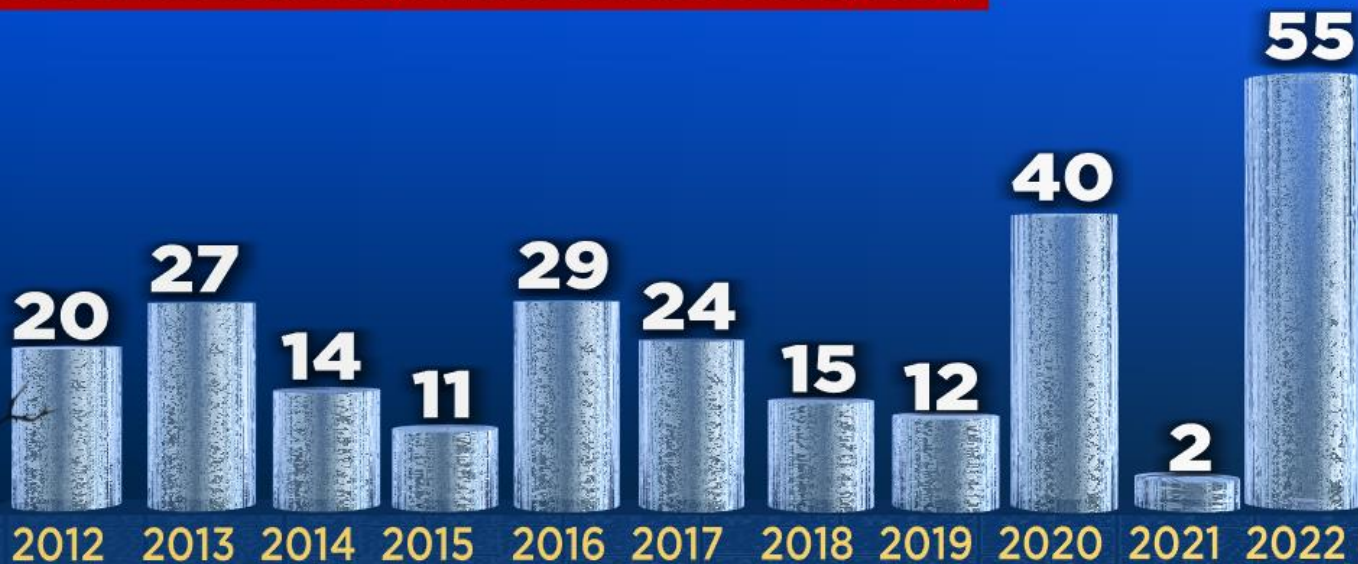
LONGEST NOVEMBER DRY SPELL

RAIN  
**5.17"**  
Normal  
November  
**5.45"**

**Lots of mountain snow late November due to cool+wet**

## **FIRST ALERT SNOWPACK ON MT. HOOD**

**SNOW DEPTH IN INCHES (Bottom of Pucci Lift 5,400')**

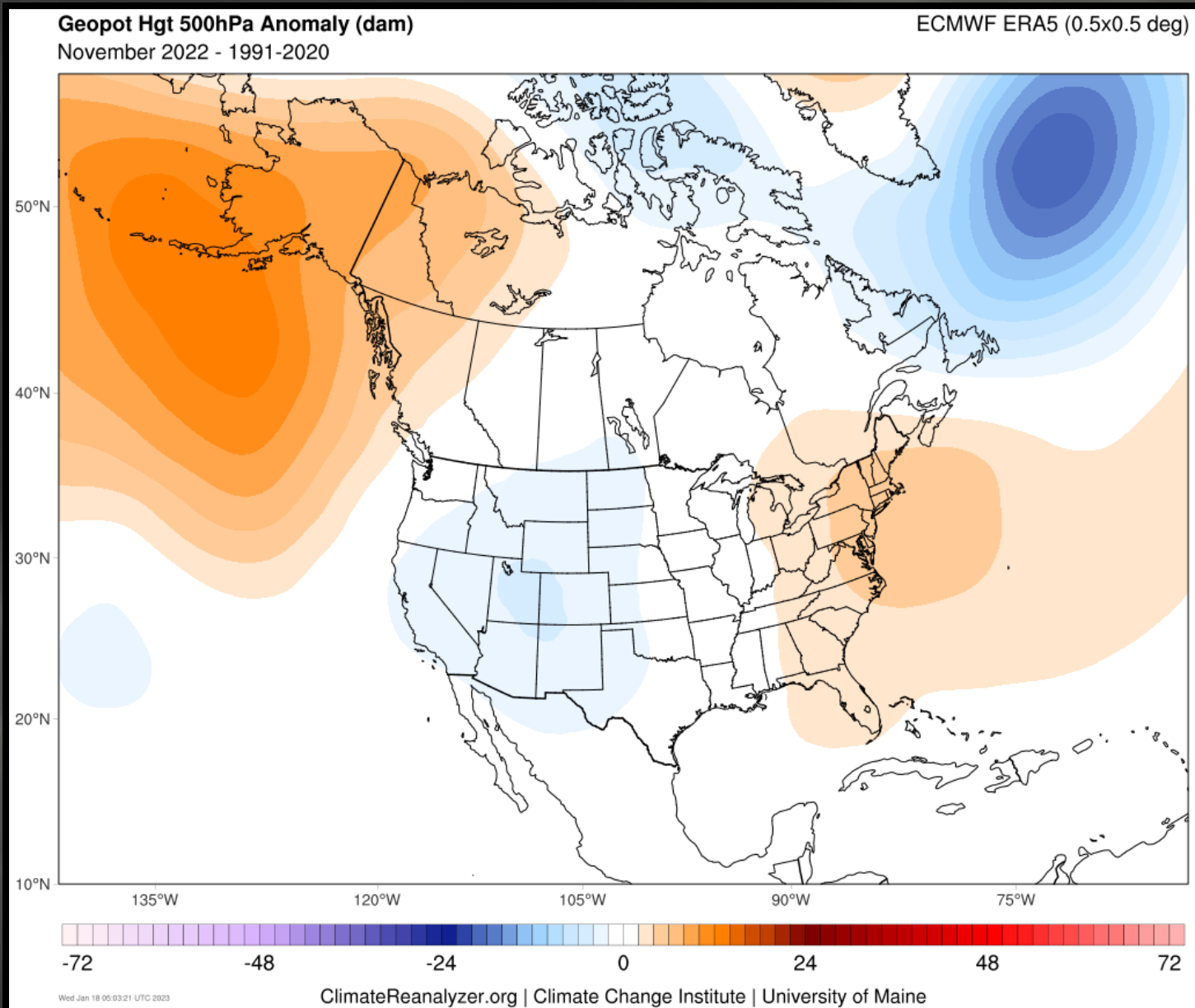


**NOVEMBER 30TH EACH YEAR**



# NOVEMBER 500mb HEIGHTS

Persistent ridging in eastern Pacific





# DECEMBER 2022

A cool month!, weather turns much more active

## FIRST ALERT DECEMBER 2022 IN PORTLAND

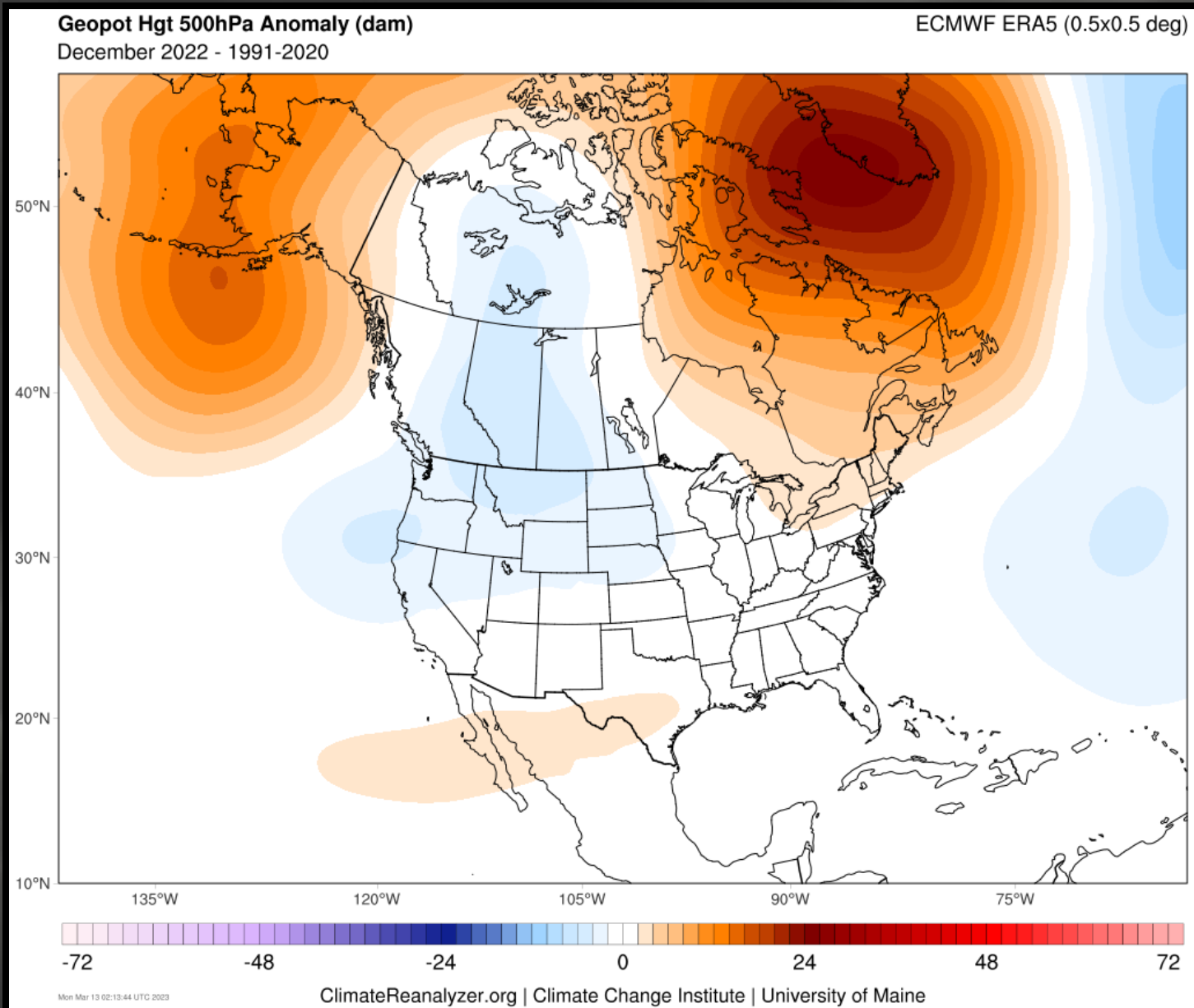
SUN	MON	TUE	WED	THU	FRI	SAT
				1 43°	2 44°	3 46°
4 41°	5 44°	6 43°	7 42°	8 42°	9 44°	10 47°
11 46°	12 48°	13 41°	14 48°	15 45°	16 43°	17 41°
18 45°	19 43°	20 49°	21 42°	22 25°	23 29°	24 35°
25 43°	26 46°	27 55°	28 49°	29 45°	30 55°	31 50°

**-2.6°**  
from normal

COOLEST  
DECEMBER  
SINCE 2016

# DECEMBER 500MB HEIGHTS

Persistent ridging in eastern Pacific

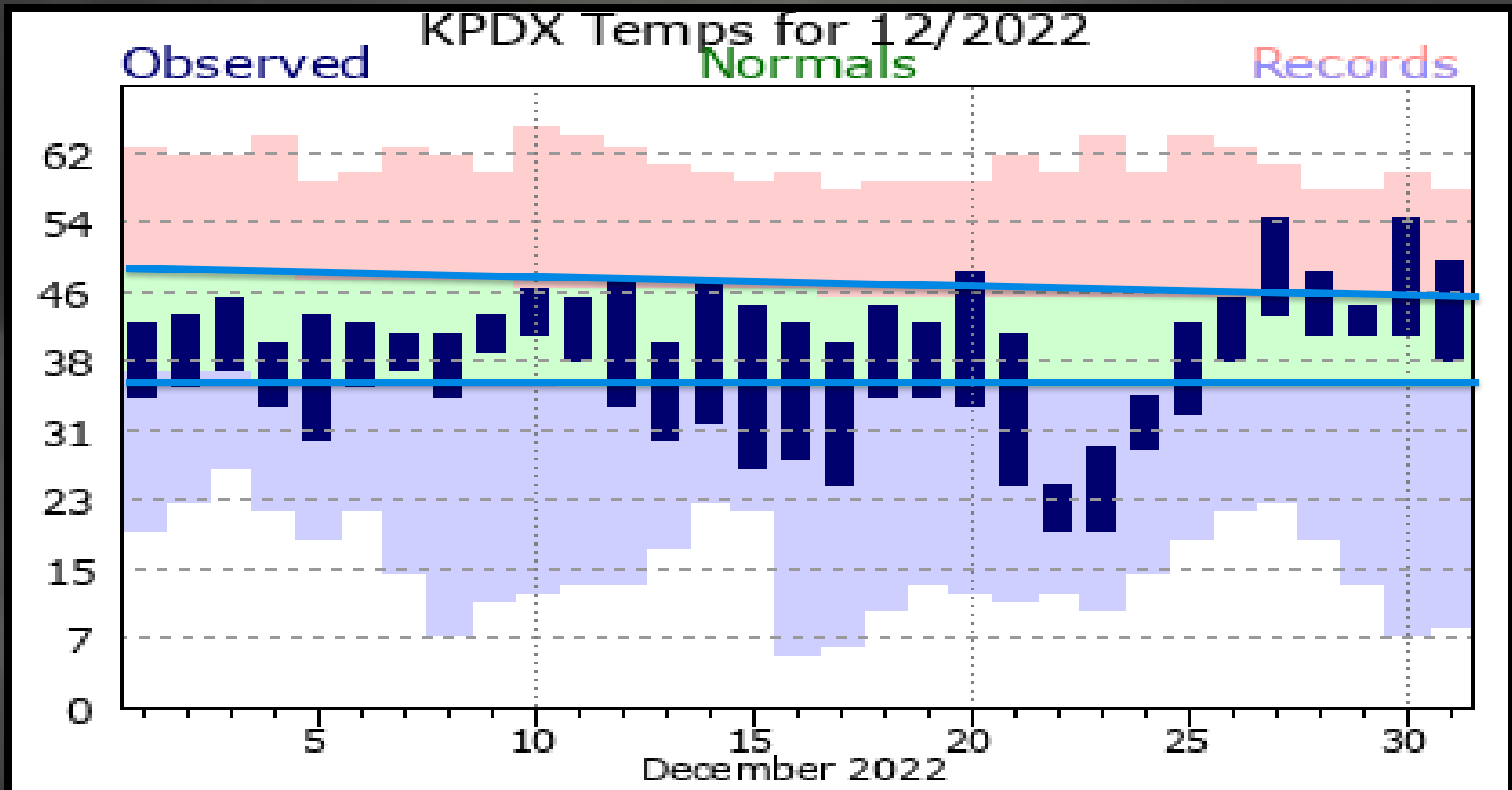


**December starts briefly white on the northern coastline**



# DECEMBER

Near average month, but very cold (for Portland) for 3 days

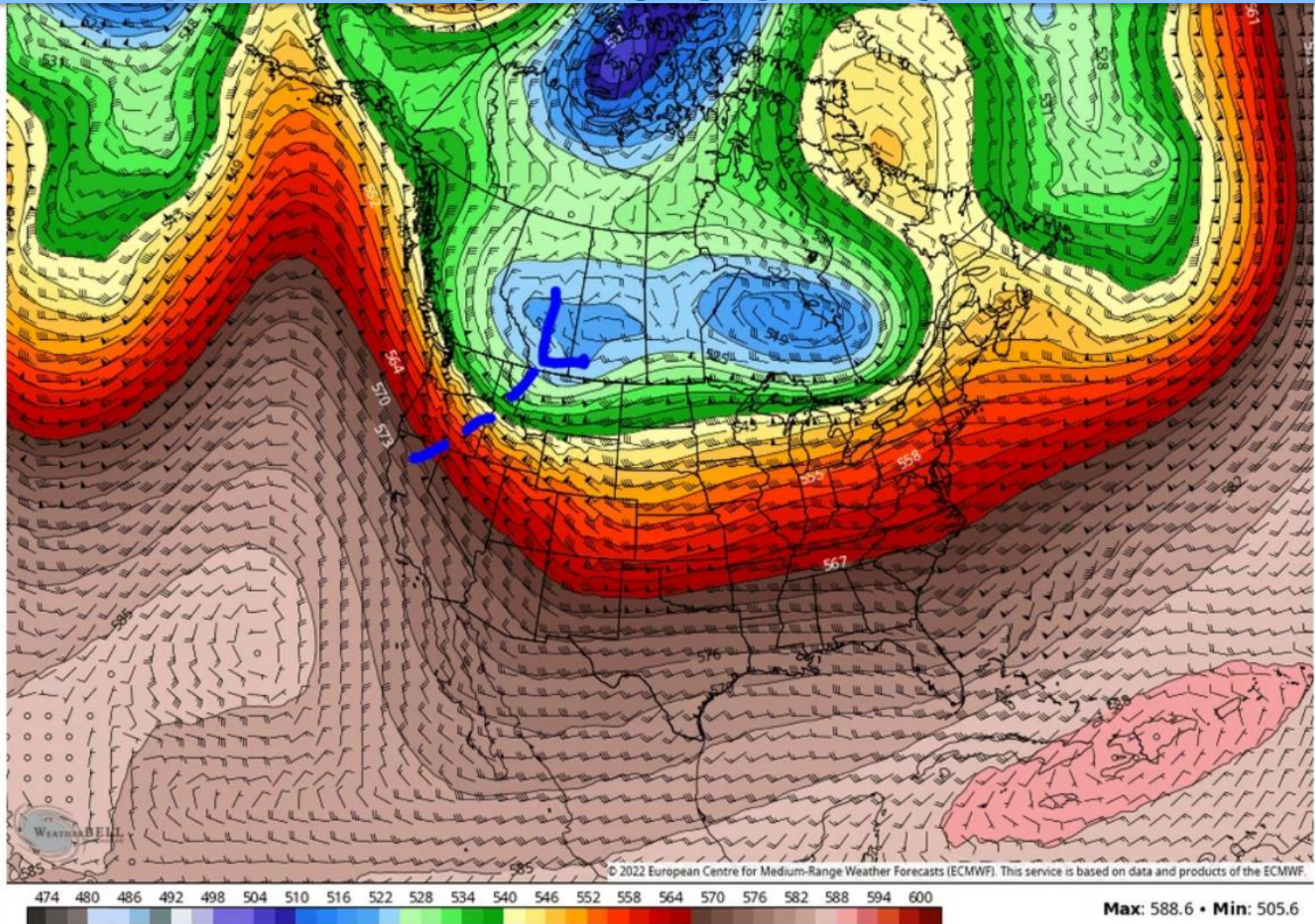




**DECEMBER 21<sup>ST</sup>**

Cold arctic air gives us a “glancing blow”

**Cold upper-level trough swinging by on way to central USA**





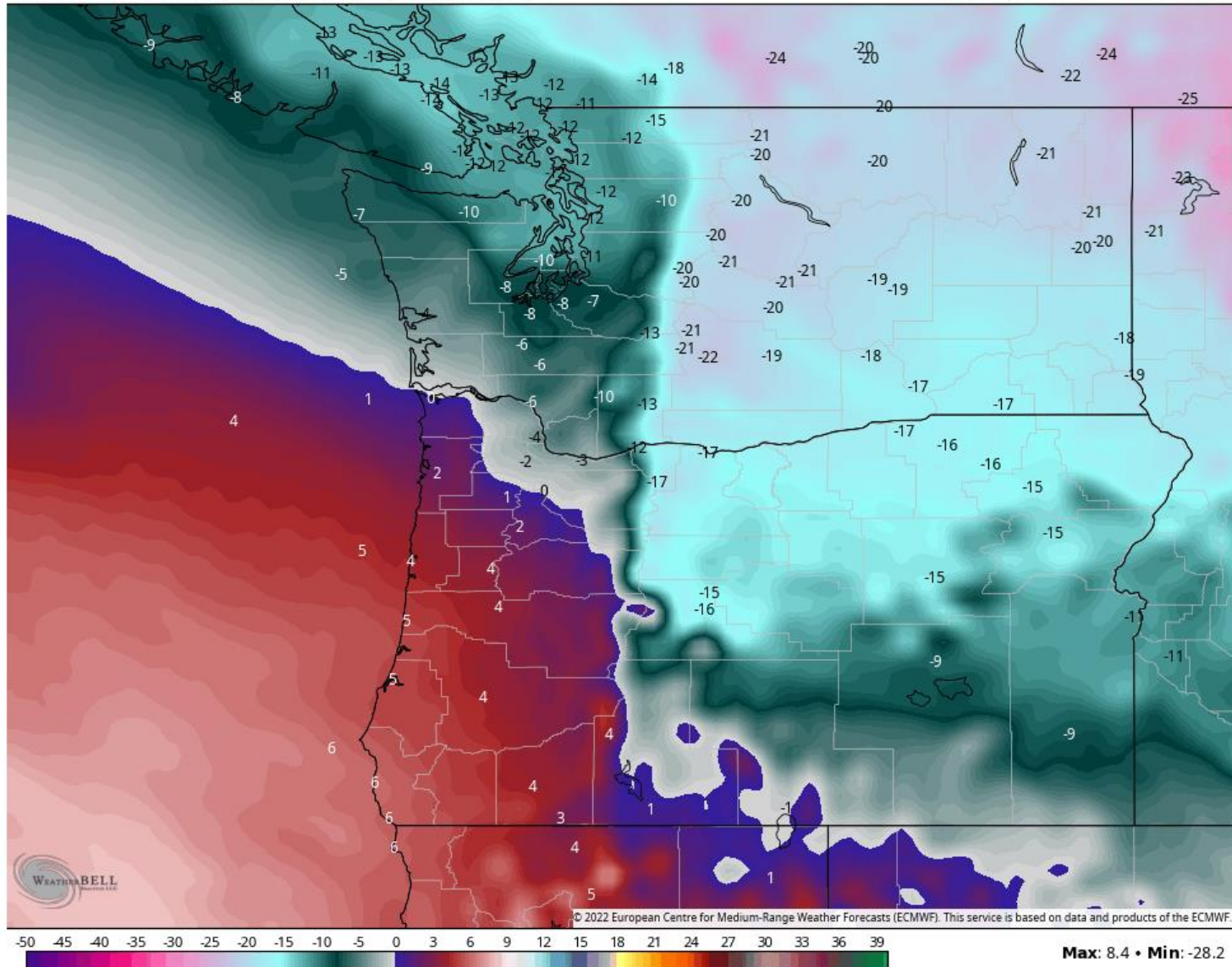
# DECEMBER 21<sup>ST</sup>

Cold arctic air gives us a “glancing blow”

**Notice how shallow cold air is west of Cascades?**

ECMWF 0.1° Init 12z 21 Dec 2022 • 850mb Temperature (°C)

Hour: 24 • Valid: 12z Thu 22 Dec 2022



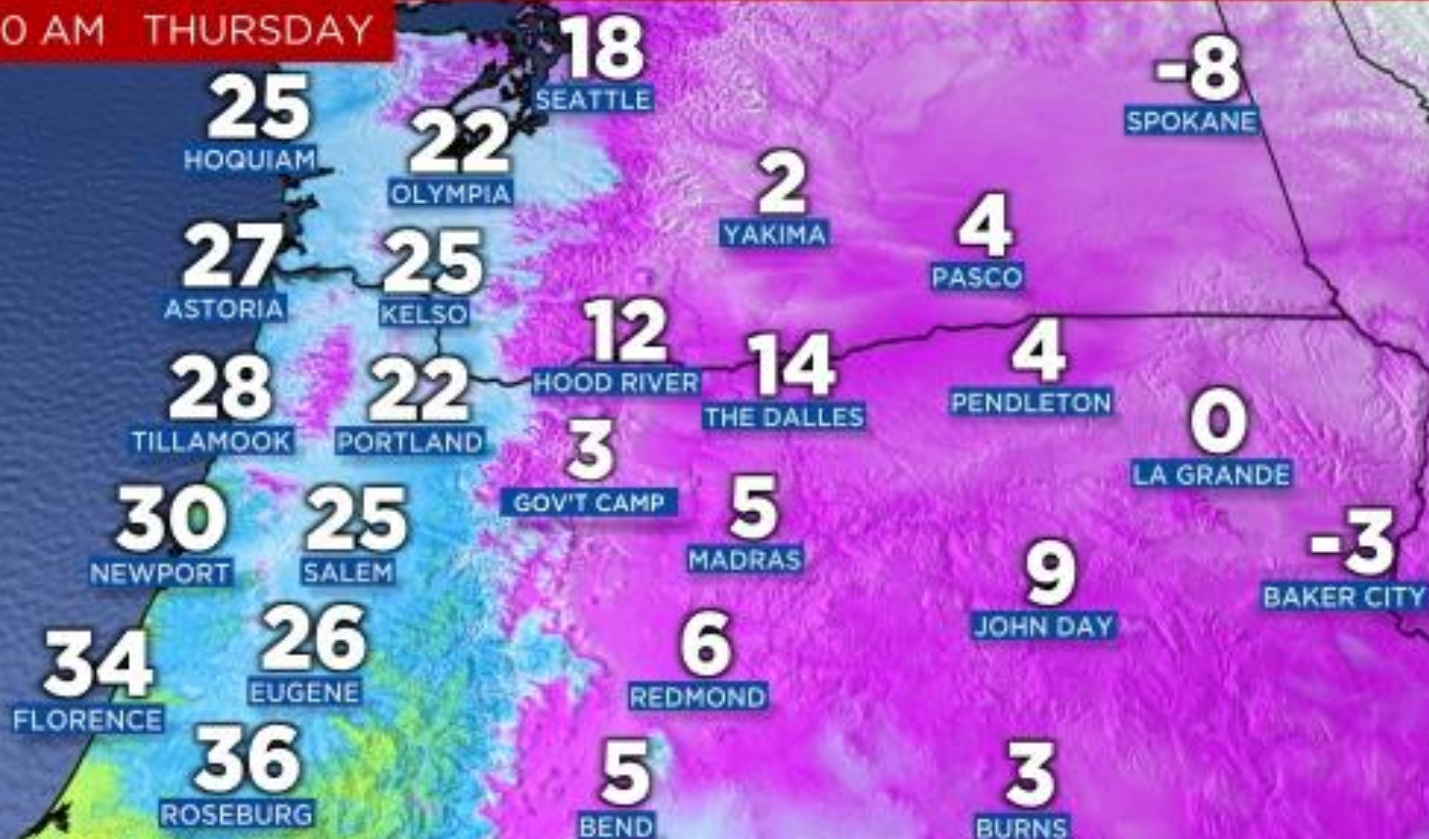
**THURSDAY DECEMBER 22<sup>nd</sup>**

Moisture rides over shallow cold air

**EXCELLENT MODEL FORECASTS: COLD AIR + ZR + ICE PELLETS**

## **FIRST ALERT TEMPERATURES**

8:00 AM THURSDAY





**THURSDAY DECEMBER 22<sup>nd</sup>**

**R.I.P. VISTA HOUSE WIND SENSOR**

**Oregon State Parks working on a new/stronger support**

Weather conditions for:

DW6193 Crown Point, OR (APRSWXNET/CWOP -

Elev: 751 ft; Lat/Lon: 45.53883/-122.24417

[Get Yearly Precip Total \(non QA/QC'd data\)](#)

[Get Water Year Precip Total \(non QA/QC'd data\):](#)

For selected observations near this location: [click here](#)

Date/Time (L)	Temp. (°F)	Wind Chill (°F)	Wind Direction	Wind Speed (mph)	Station Pressure (in Hg)
Dec 22, 2:10 pm	13			0	29.43
Dec 22, 2:05 pm	13			0	29.38
Dec 22, 2:00 pm	13			0	29.39
Dec 22, 1:55 pm	13			0	29.43
Dec 22, 1:50 pm	13			0	29.39
Dec 22, 1:45 pm	13			0	29.39
Dec 22, 1:40 pm	13			0	29.40
Dec 22, 1:35 pm	13			0	29.39
Dec 22, 1:30 pm	13			0	29.39
Dec 22, 1:25 pm	13			0	29.44
Dec 22, 1:20 pm	13			0	29.42
Dec 22, 1:15 pm	13			0	29.39
Dec 22, 1:10 pm	13			0	29.43
Dec 22, 1:05 pm	13			0	29.42
Dec 22, 1:00 pm	13			0	29.39
Dec 22, 12:55 pm	13			0	29.47
Dec 22, 12:50 pm	13			0	29.41
Dec 22, 12:45 pm	13	-9	ENE	34G78	29.40
Dec 22, 12:40 pm	13	-11	ENE	42G78	29.45
Dec 22, 12:35 pm	13	-12	ENE	48G75	29.41
Dec 22, 12:30 pm	13	-12	ENE	47G78	29.43
Dec 22, 12:25 pm	13	-12	ENE	46G78	29.43
Dec 22, 12:20 pm	13	-13	ENE	50G79	29.43
Dec 22, 12:15 pm	13	-12	ENE	45G79	29.47
Dec 22, 12:10 pm	13	-13	ENE	52G82	29.44
Dec 22, 12:05 pm	13	-12	ENE	47G82	29.45



## FRIDAY DECEMBER 23<sup>rd</sup>

Extremely large cross-Cascade pressure gradient

**Damaging wind western Gorge and far east metro**

Weather conditions for:

CW2664 Corbett, OR (APRSWXNET/CWOP - [PQR](#))

Elev: 659 ft; Lat/Lon: 45.53133/-122.29167

[Get Yearly Precip Total \(non QA/QC'd data\)](#)

[Get Water Year Precip Total \(non QA/QC'd data\):](#)

For selected observations near this location: [click here](#)

Date/Time (L)	Temp. (°F)	Dew (°F)	Relative Point Humidity (%)	Wind Chill (°F)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)
Dec 23, 7:52 am	14	11	88	-11	E	48	80
Dec 23, 7:43 am	14	11	87	-11	E	47	75
Dec 23, 7:34 am	14	11	88	-11	E	48	76
Dec 23, 7:25 am	14	11	88	-11	E	48	75
Dec 23, 7:16 am	14	11	88	-11	E	50	75
Dec 23, 7:07 am	14	11	88	-12	E	52	88
Dec 23, 6:58 am	14	11	87	-11	E	51	88
Dec 23, 6:49 am	14	11	88	-12	E	54	83

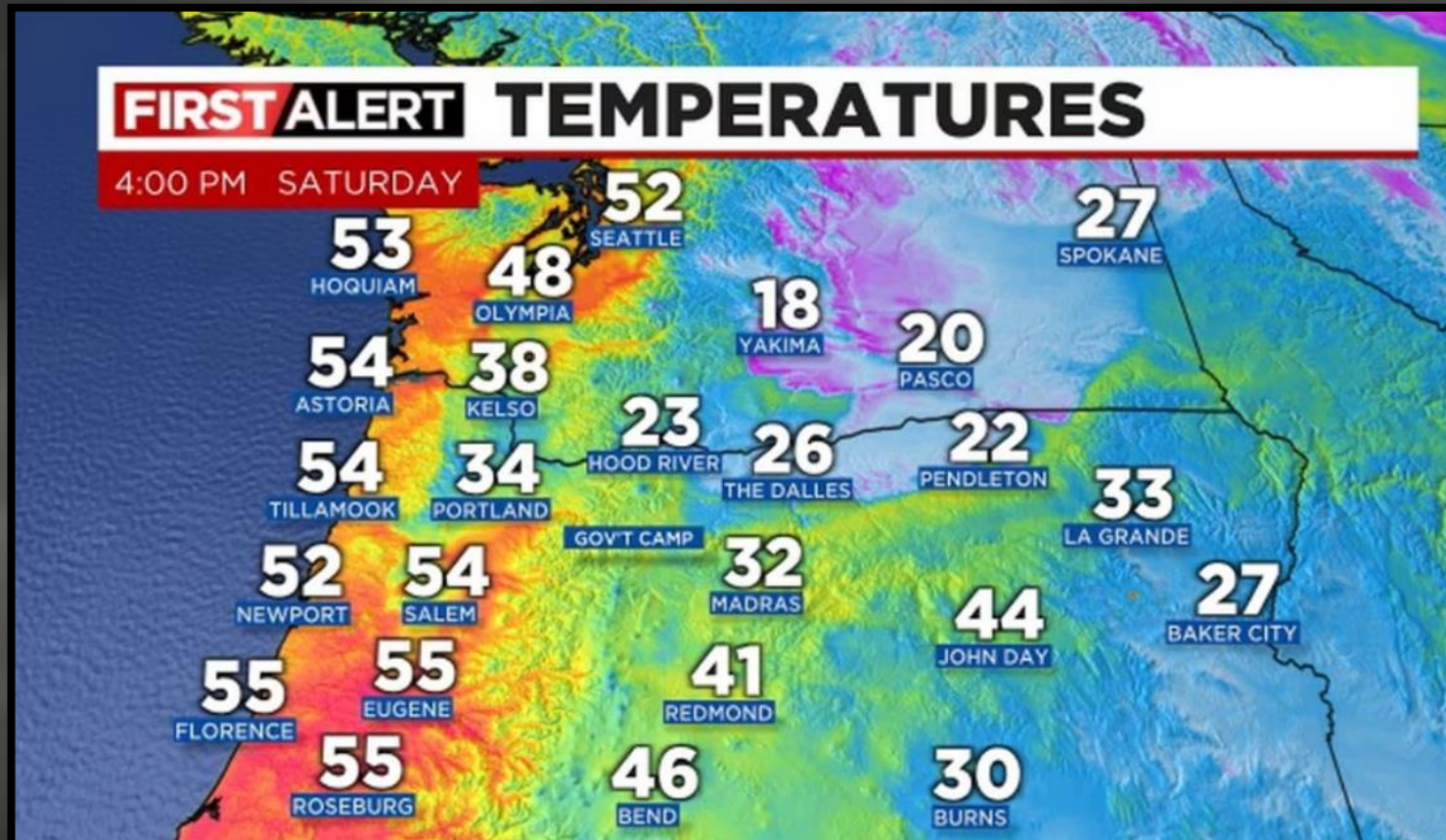
## RELATIVELY MILD ICE STORM DECEMBER 22<sup>ND</sup>-24<sup>TH</sup> DUE TO...

1. Precipitation not too heavy
2. More ice pellets than freezing rain

## FORECASTERS LEARN ABOUT COLD EAST WIND...AGAIN

No major change to low level airmass until wind switches to southerly!

**Merry Christmas! Parts of Portland still iced over Christmas Eve**



4"+ RAIN IN 4 DAYS CHRISTMAS EVE TO 27TH  
SATURATED GROUND

**FIRST ALERT** DECEMBER 2022 IN PORTLAND

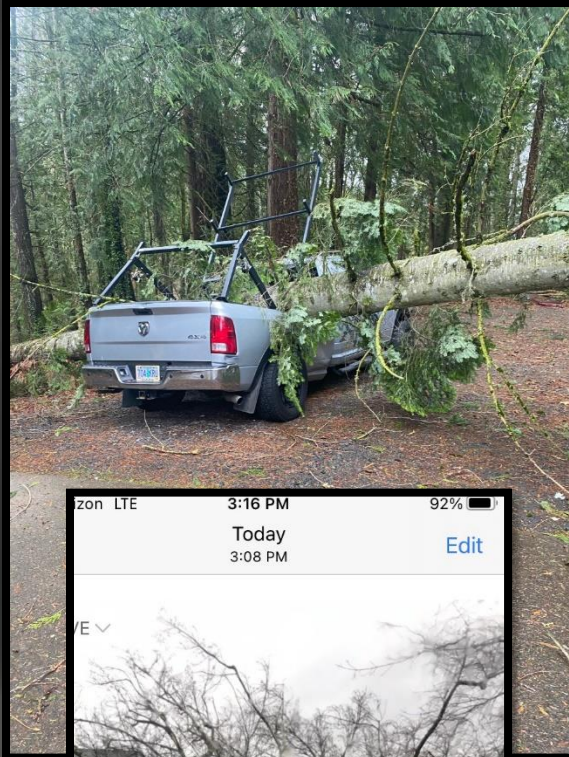
SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
					.03"	
4	5	6	7	8	9	10
.14"				.36"	.76"	.54"
11	12	13	14	15	16	17
18	19	20	21	22	23	24
.02"		.17"		.05"	.16"	.72"
25	26	27	28	29	30	31
.55"	2.12"	1.21"		.53"	.30"	.10"

RAIN  
**7.76"**

Normal  
December  
**5.77"**



# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS (27<sup>th</sup>)



zon LTE 3:16 PM 92%  
Today 3:08 PM Edit





# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS (27<sup>th</sup>)

UW WRF-GFS 4km Domain

Fcst: 6 h

Temperature at 925 mb (°C)

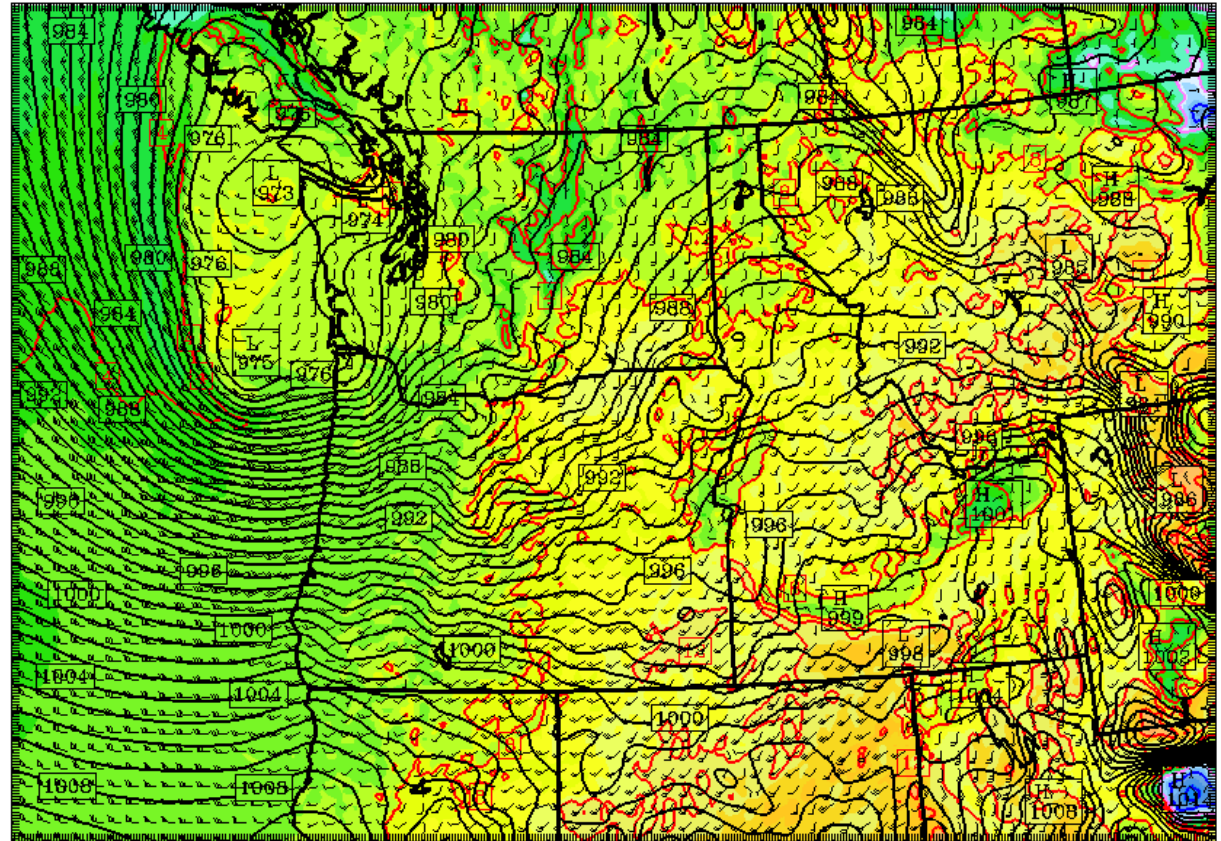
Sea Level Pressure (hPa)

Init: 12 UTC Tue 27 Dec 22

Valid: 18 UTC Tue 27 Dec 22 (10 PST Tue 27 Dec 22)

10m Wind (full barb = 10kts)

10 a.m. Tuesday  
975 mb surface  
low just offshore.  
Tight southerly  
gradient to the  
south



CONTOURS: UNITS=hPa LOW= 974.00 HIGH= 1013.0 INTERVAL= 1.0000  
CONTOURS: UNITS=°C LOW= -8.0000 HIGH= 16.0000 INTERVAL= 4.0000



Model Info: V4.1.3 G-D Ens YSU PBL Thompson Noah-MP 4.0 km, 37 levels, 24 sec  
LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor

# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS





# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS (27<sup>th</sup>)

UW WRF-GFS 4km Domain

Fest: 9 h

Temperature at 925 mb (°C)

Sea Level Pressure (hPa)

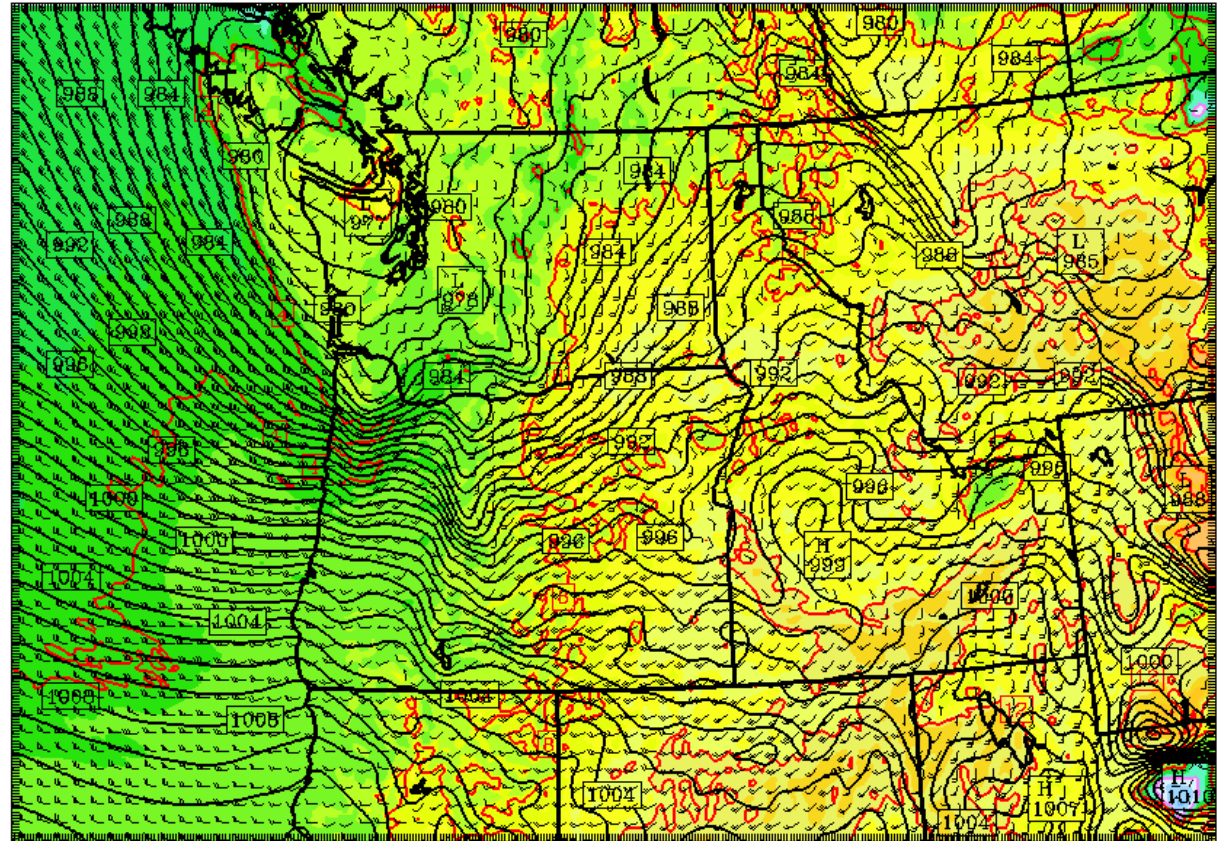
Init: 12 UTC Tue 27 Dec 22

Valid: 21 UTC Tue 27 Dec 22 (13 PST Tue 27 Dec 22)

10m Wind (full barb = 10kts)

1 p.m. Tuesday

~978 mb surface  
low slides across  
Longview  
heading east &  
weakening.  
Strongest wind  
PDX-EUG right  
now



CONTOURS: UNITS=hPa LOW= 978.00 HIGH= 1011.0 INTERVAL= 1.0000  
CONTOURS: UNITS=°C LOW= 0.0000 HIGH= 16.000 INTERVAL= 4.0000



Model Info: V4.1.3 G-D Ens YSU PBL Thompson Noah-MP 4.0 km, 37 levels, 24 sec  
LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor

# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS (27<sup>th</sup>)

UW WRF-GFS 4km Domain

Fest: 12 h

Temperature at 925 mb (°C)

Sea Level Pressure (hPa)

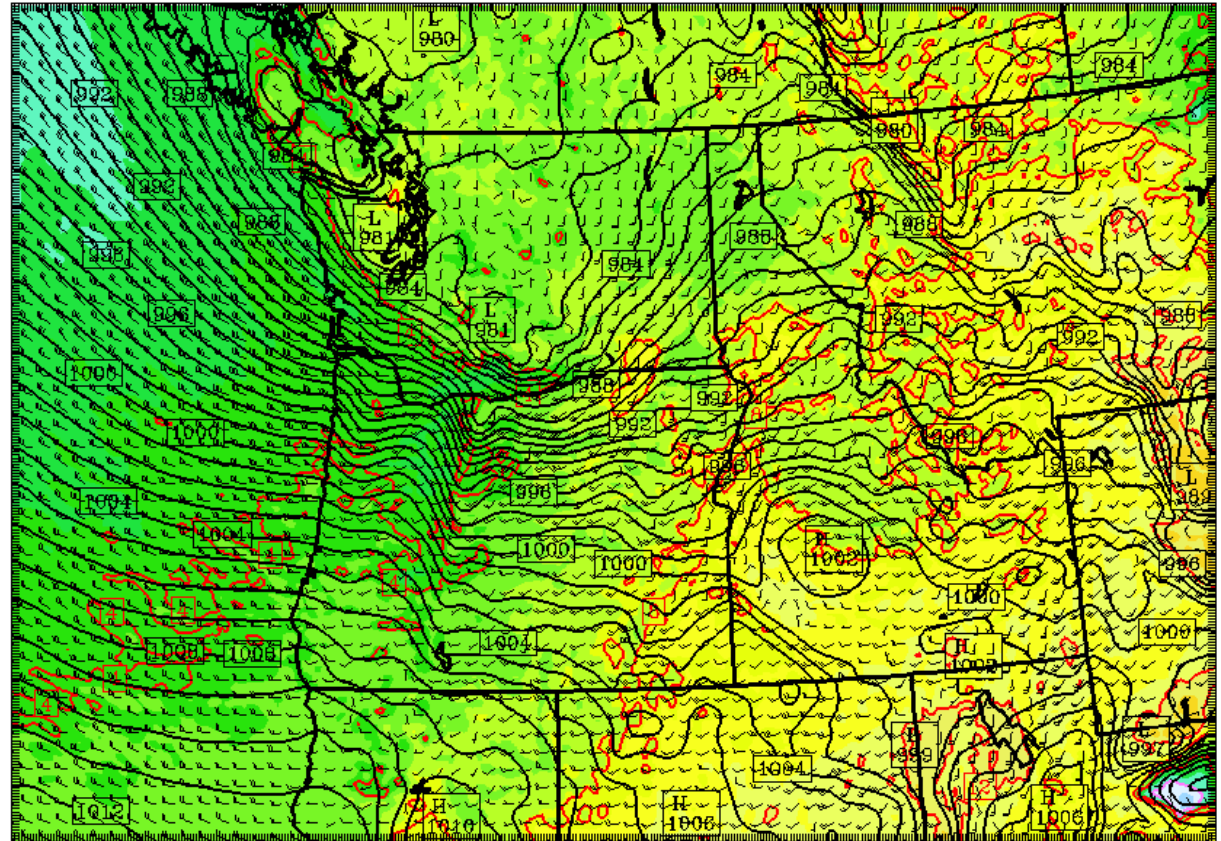
Init: 12 UTC Tue 27 Dec 22

Valid: 00 UTC Wed 28 Dec 22 (16 PST Tue 27 Dec 22)

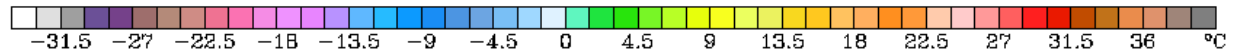
10m Wind (full barb = 10kts)

4 p.m. Tuesday

~980 mb surface  
low near Yakima.  
Wind easing west  
of Cascades. Big  
surge of  
west/southwest  
wind Gorge +  
eastside



CONTOURS: UNITS=hPa LOW= 978.00 HIGH= 1012.0 INTERVAL= 1.0000  
CONTOURS: UNITS=°C LOW= 0.0000 HIGH= 12.000 INTERVAL= 4.0000



Model Info: V4.1.3 G-D Ens YSU PBL Thompson Noah-MP 4.0 km, 37 levels, 24 sec  
LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor



# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS

NZUS01 KPQR 281713

DIENTS

\*\* PQR GRADIENT TABLE 12/28/22 17Z \*\*

281713Z

DD/HH	ACV- UIL	ACV- AST	OTH- UIL	ACV- OTH	OTH- AST	AST- HQM	AST- UIL	RDD- OTH	MFR- AST	OTH- SEA	OTH- EUG	OTH- RDM
28/17	+8.0	+6.3	+5.8	+2.2	+4.1	+0.2	+1.7	+1.9	+5.5	+4.9	+0.4	+3.4
28/15	+9.5	+7.1	+7.1	+2.4	+4.7	+1.0	+2.4	+0.7	+5.0	+6.4	+1.1	+4.5
28/13	+10.0	+7.3	+7.7	+2.3	+5.0	+1.1	+2.7	+0.4	+5.2	+7.9	+1.3	+5.3
28/11	+11.3	+8.1	+9.1	+2.2	+5.9	+1.4	+3.2	-0.2	+5.7	+9.6	+1.6	+6.9
28/09	+13.0	+9.3	+10.0	+3.0	+6.3	+1.6	+3.7	0.0	+5.9	+10.1	+1.9	+7.1
28/07	+14.8	+10.8	+11.4	+3.4	+7.4	+1.6	+4.0	+0.3	+7.2	+11.9	+2.5	+7.7
28/05	+16.0	+11.4	+11.8	+4.2	+7.2	+2.3	+4.6	+0.9	M	+13.2	+1.9	+6.7
28/03	+17.6	+11.6	+13.9	+3.7	+7.9	+2.6	+6.0	+0.6	+7.7	+16.6	+2.9	+6.7
28/01	+21.8	+13.7	+17.4	+4.4	+9.3	+5.0	+8.1	+0.4	+8.7	+18.9	+3.3	+6.5
27/23	+27.4	+19.1	+22.2	+5.2	+13.9	+5.8	+8.3	+0.6	+13.0	+20.5	+2.8	+10.4
27/21	+30.5	+29.0	+24.2	+6.3	+22.7	+0.1	+1.5	+2.1	+23.1	+22.1	+4.9	+11.7
27/19	+32.6	+28.9	+23.6	+9.0	+19.9	+1.4	+3.7	+5.9	+21.5	+19.7	+5.2	+9.5
27/17	+33.6	+29.1	+21.7	+11.9	+17.2	+0.7	+4.5	+8.7	M	+16.5	+4.8	+7.5

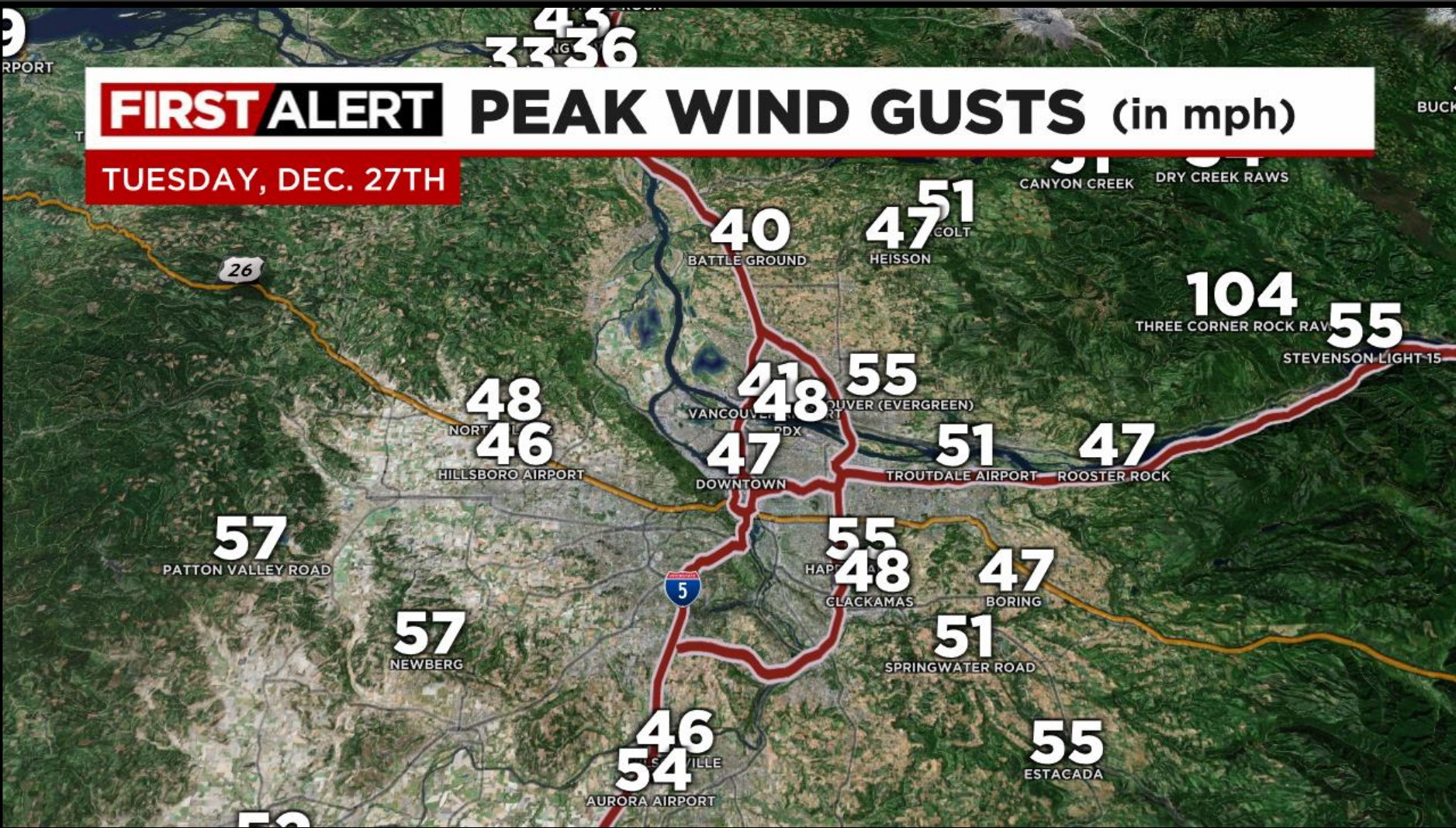
DD/HH	EUG- PDX	PDX- SEA	OTH- GEG	EUG- RDM	HQM- OLM	AST- PDT	AST- PDX	PDX- PDT	AST- DLS	PDX- DLS	PDX- TTD	TTD- DLS
28/17	+1.8	+2.7	+10.2	+3.0	-0.2	+2.4	-1.9	+4.3	+0.5	+2.4	-0.1	+2.5
28/15	+2.0	+3.3	+12.3	+3.4	-0.2	+3.3	-1.6	+4.9	+1.0	+2.6	0.0	+2.6
28/13	+2.3	+4.3	+14.0	+4.0	+0.3	+4.0	-1.4	+5.4	+1.6	+3.0	0.0	+3.0
28/11	+3.1	+4.9	+15.8	+5.3	+0.4	+4.2	-1.2	+5.4	+1.8	+3.0	+0.4	+2.6
28/09	+3.0	+5.2	+16.7	+5.2	+0.2	+4.5	-1.4	+5.9	+2.4	+3.8	+0.4	+3.4
28/07	+3.5	+5.9	+18.0	+5.2	+0.7	+4.4	-1.4	+5.8	+2.5	+3.9	+0.1	+3.8
28/05	+4.5	+6.8	+18.4	+4.8	+0.7	+5.9	-0.8	+6.7	+2.6	+3.4	-0.1	+3.5
28/03	+4.3	+9.4	+18.9	+4.8	+1.5	+5.2	-0.7	+5.9	+2.3	+3.0	+0.2	+2.8
28/01	+3.8	+11.8	+18.6	+3.2	+2.4	+6.8	-2.2	+9.0	+2.5	+5.8	0.0	+5.8
27/23	+8.7	+9.9	+17.8	+7.6	+0.7	+2.7	-2.4	+5.1	+1.4	+3.8	+0.2	+3.6
27/21	+10.9	+8.3	+17.2	+6.8	-0.2	-6.6	-6.9	+0.3	-6.7	+0.2	-0.6	+0.8
27/19	+8.9	+5.6	+13.2	+4.3	-0.9	-6.5	-5.8	-0.7	-5.6	+0.2	+0.1	+0.1
27/17	+6.4	+5.3	+8.5	+2.7	-0.1	-8.2	-6.0	-2.2	-7.2	-1.2	-1.0	-0.2



# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS

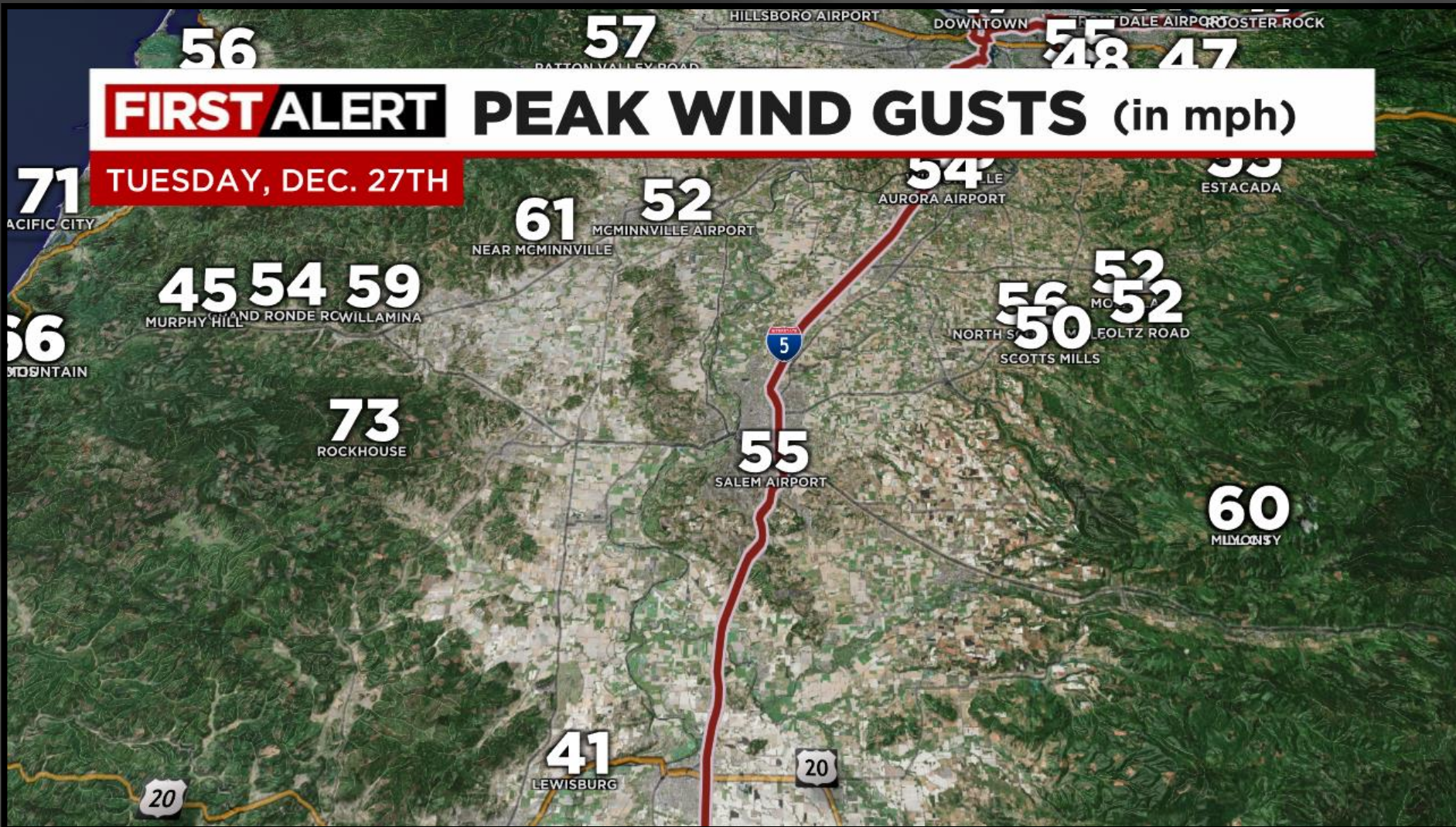
## FIRST ALERT PEAK WIND GUSTS (in mph)

TUESDAY, DEC. 27TH





# SOUTHERLY WINDSTORM 2 DAYS AFTER CHRISTMAS





## STRONG WESTERLY PUSH THROUGH GORGE

51  
CANYON CREEK

34  
DRY CREEK RAWS

### **FIRST ALERT** PEAK WIND GUSTS (in mph)

TUESDAY, DEC. 27TH

104  
THREE CORNER ROCK RAWS

55  
STEVENSON LIGHT 15

85  
VIENTO M28

68  
SWELL CITY  
ERWOOD

72  
HOOD RIVER EAST

43  
ODELL

47  
DEE  
MIDDLE MTN RAWS

59  
PARKDALE

57  
HOOD RIVER



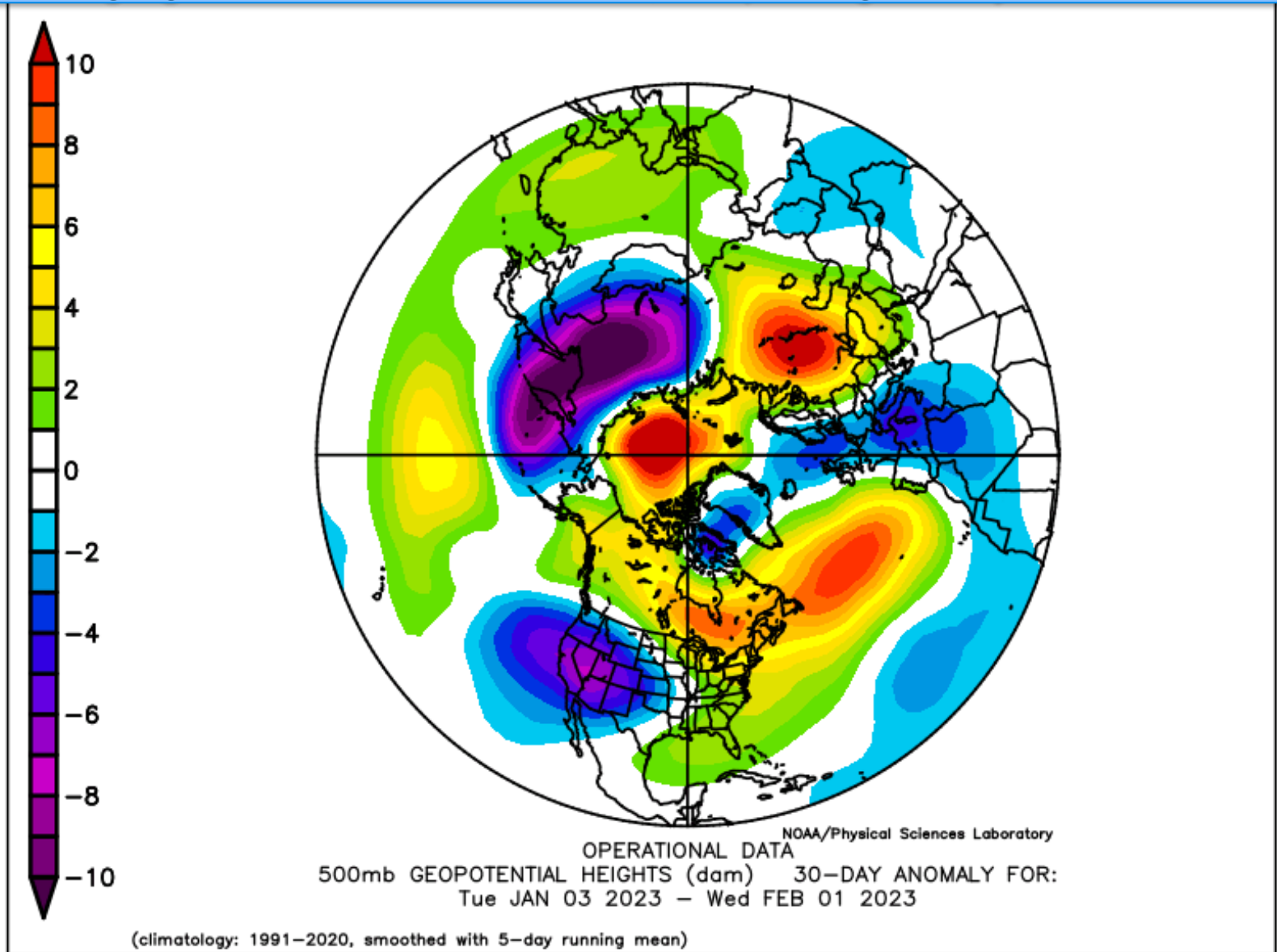
# **FIRST ALERT** POWER OUTAGES IN RECENT STORMS

SOME INFO COURTESY OF PORTLAND GENERAL ELECTRIC

STORM	Peak # of PGE customers out	Longest Outages	% of customers out
2022 Dec 27 wind	116,000	3 days	13%
2021 Feb ice storm	280,000	14+ days	32%
2021 Jan wind	95,000	2 days	11%
2017 April wind	170,000	3.5 days	20%
2014 Dec wind	83,000	1.5 days	10%
2014 Oct Wind	65,000	2.5 days	8%

# JANUARY

Weak ridging across western Canada, deep trough and jet stream to south





## MILD WESTERLY FLOW MOST OF JANUARY 2023

Jet stream aimed at California 1<sup>st</sup> half of month = lots of weak systems for us

### FIRST ALERT JANUARY 2023 IN PORTLAND

SUN	MON	TUE	WED	THU	FRI	SAT
1 48°	2 44°	3 43°	4 48°	5 51°	6 50°	7 48°
8 54°	9 53°	10 51°	11 49°	12 53°	13 54°	14 52°
15 53°	16 51°	17 51°	18 47°	19 43°	20 41°	21 47°
22 49°	23 49°	24 51°	25 48°	26 47°	27 52°	28 47°
29 39°	30 41°	31 42°				

**+1.4°**  
from normal  
6TH  
CONSECUTIVE  
MILD  
JANUARY



## MILD WESTERLY FLOW MOST OF JANUARY 2023

Jet stream aimed at California 1<sup>st</sup> half of month = lots of weak systems for us

### FIRST ALERT JANUARY 2023 IN PORTLAND

SUN	MON	TUE	WED	THU	FRI	SAT
1 0.00"	2 .02"	3 .07"	4 .12"	5 .08"	6 .09"	7 .12"
8 .62"	9 .26"	10 .11"	11 .30"	12 .19"	13 .27"	14 .25"
15 .19"	16 .09"	17 .02"	18 .31"	19 0.00"	20 0.00"	21 .09"
22 0.00"	23 0.00"	24 0.00"	25 0.00"	26 0.00"	27 .09"	28 .05"
29 0.00"	30 0.00"	31 0.00"				

RAIN  
**3.34"**

NORMAL  
JANUARY  
**5.03"**

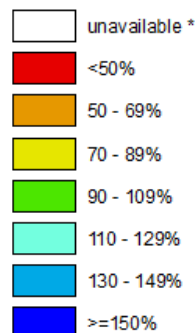
# GREAT OREGON SNOWPACK!

JANUARY 1st

## Oregon SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jan 01, 2023

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1991-2020 Median

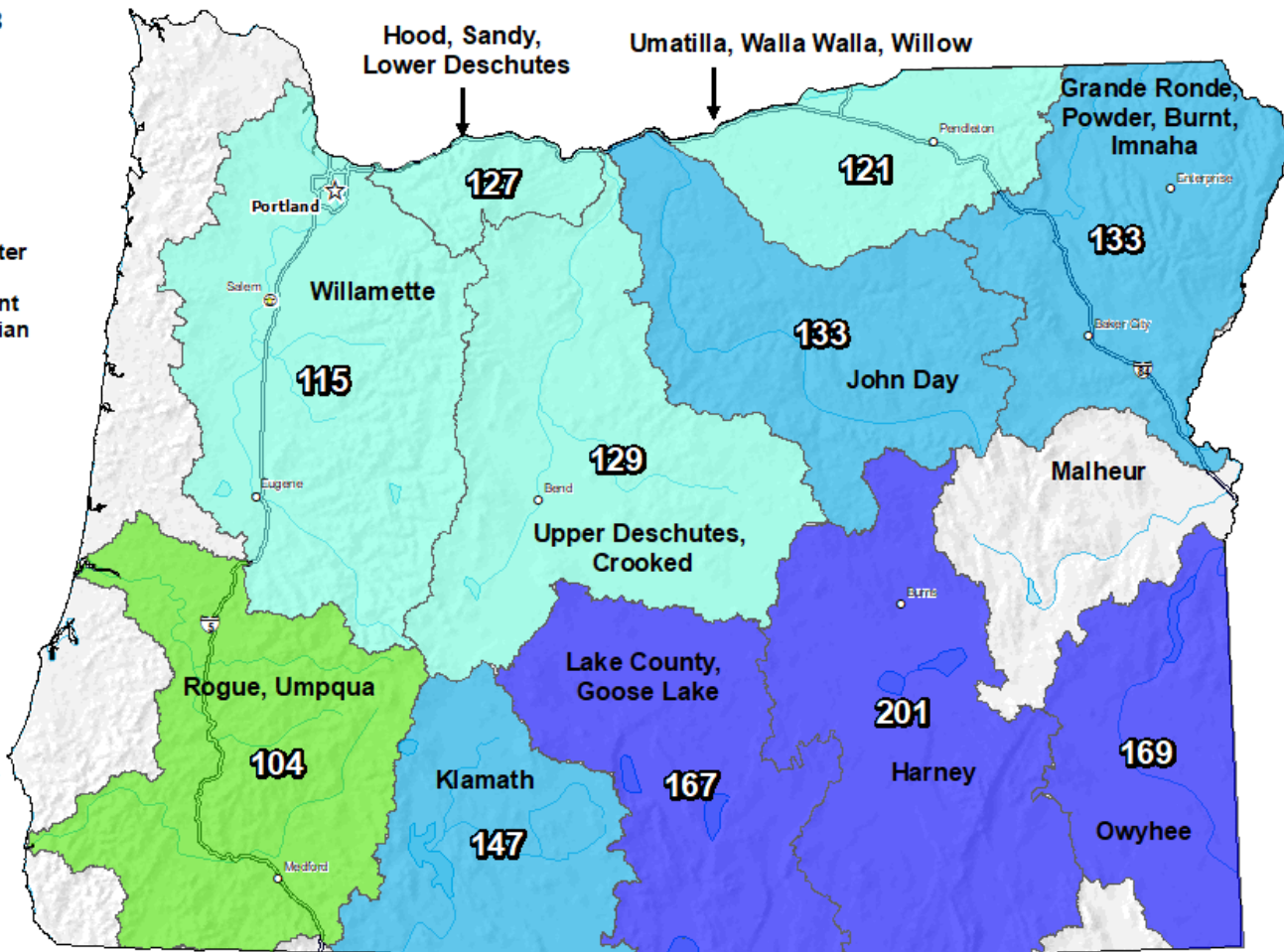


\* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional Data  
Subject to Revision



The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).



0 10 20 40 60 80 100 Miles

Prepared by:  
USDA/NRCS National Water and Climate Center  
Portland, Oregon  
<https://www.nrcs.usda.gov/wps/portal/wcc/home/>

# EASTERLY DOWNSLOPE WINDSTORM ON 4TH

UW WRF-GFS 12km Domain

Init: 00 UTC Thu 05 Jan 23

Fcst: 0 h

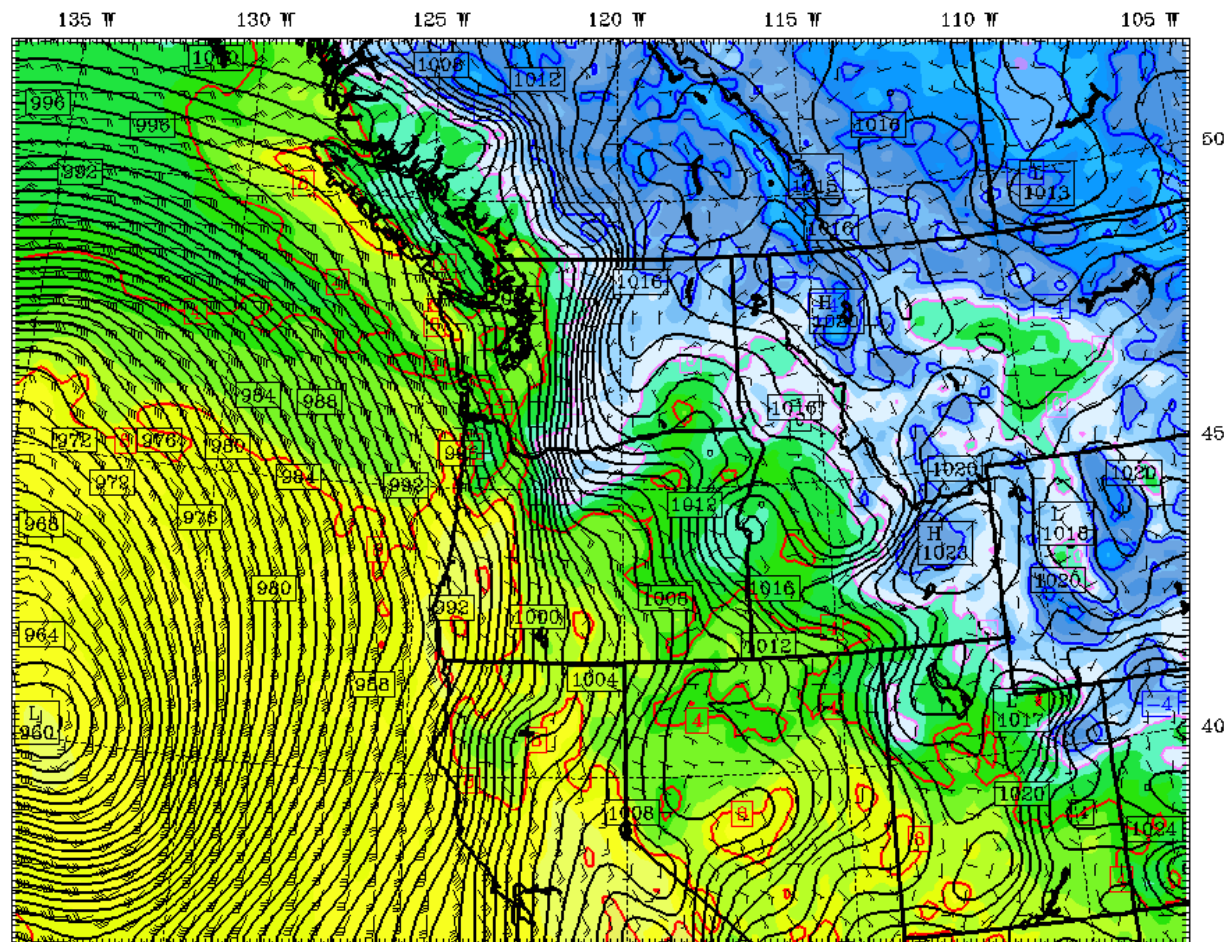
Valid: 00 UTC Thu 05 Jan 23 (16 PST Wed 04 Jan 23)

Temperature at 925 mb (°C)

Sea Level Pressure (hPa)

Wind at 10m (full barb = 10kts)

**“BOMB CYCLONE”  
FAR  
OFFSHORE**  
BIG PRESSURE  
DIFFERENCE  
EAST TO WEST



CONTOURS: UNITS=hPa LOW= 961.00 HIGH= 1026.0 INTERVAL= 1.0000

CONTOURS: UNITS=°C LOW= -12.000 HIGH= 12.000 INTERVAL= 4.0000



Model Info: V4.1.3 G-D Ens YSU PBL Thompson Noah-MP 12 km, 37 levels, 72 sec

LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor



# EASTERLY DOWNSLOPE WINDSTORM ON 4TH

UW WRF-GFS 1.33km Domain

Init: 12 UTC Wed 04 Jan 23

Fest: 13.00 h

Valid: 01 UTC Thu 05 Jan 23 (17 PST Wed 04 Jan 23)

10m Wind Gust (full barb = 10kts)

Sea Level Pressure (hPa)

123 W

122 W

121 W

350

300

200

250

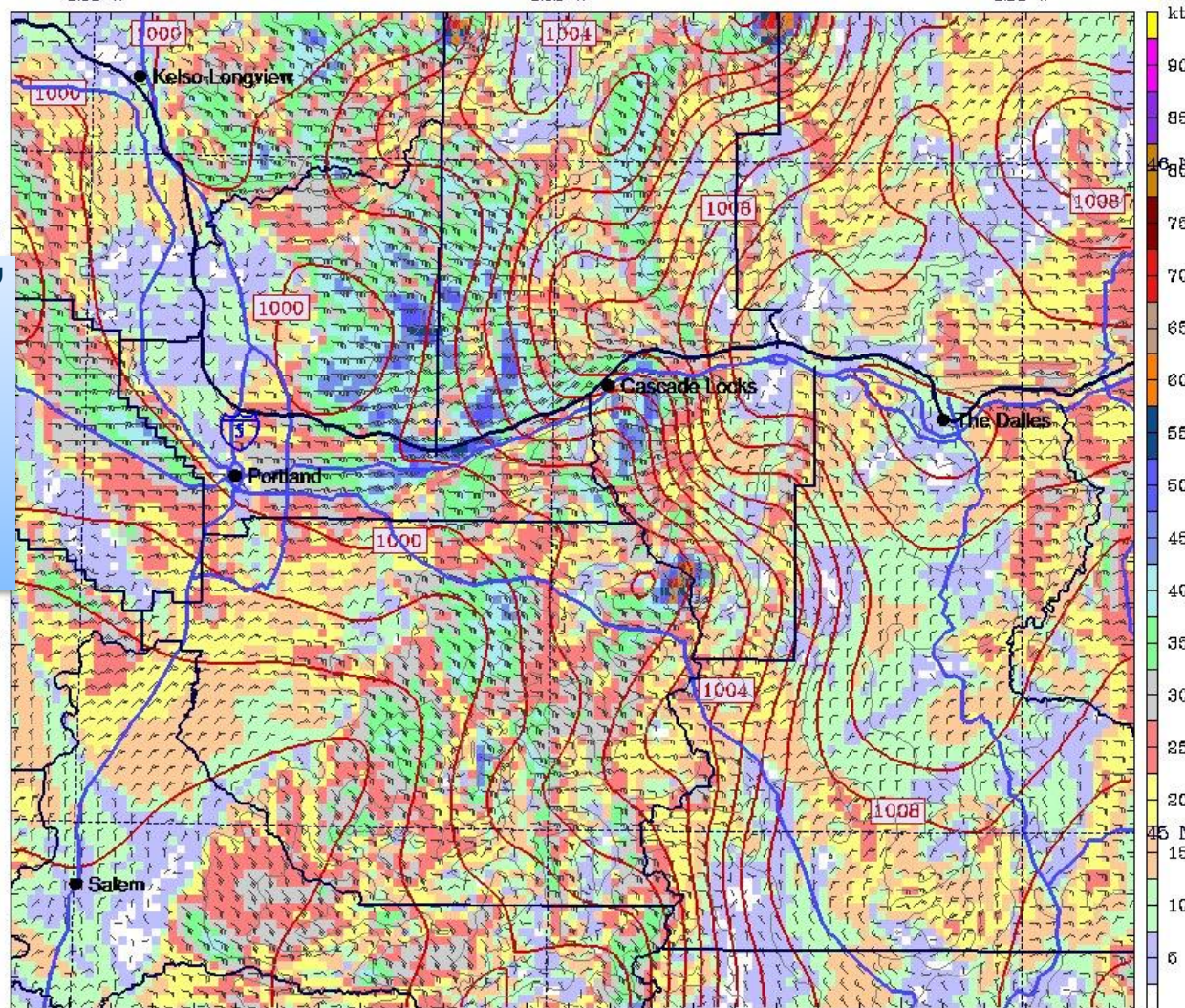
300

CONTOURS: UNITS=hPa LOW= 997.00 HIGH= 1011.0 INTERVAL= 1.0000

Model Info: V4.1.3 No Cu YSU PBL Thompson Noah-MP 1.3 km, 37 levels, 8 sec

LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor

**“BOMB CYCLONE”  
FAR  
OFFSHORE  
BIG PRESSURE  
DIFFERENCE  
EAST TO WEST**





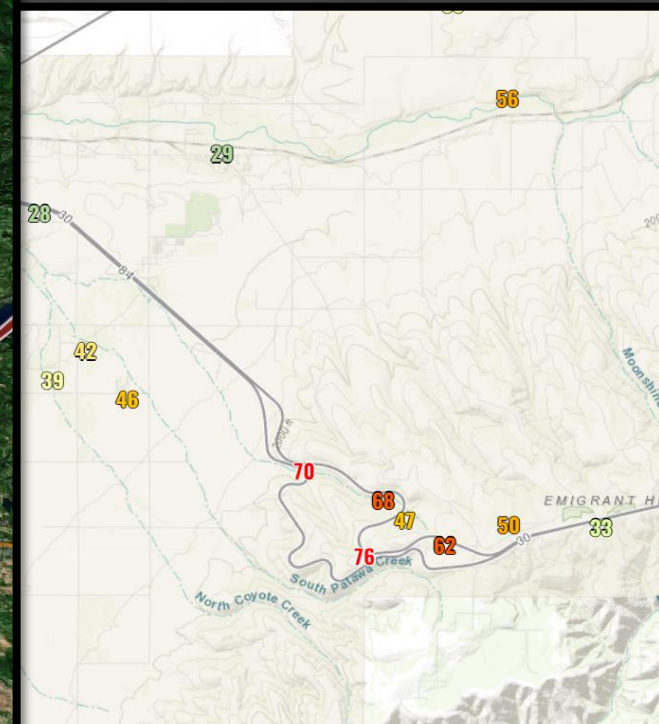
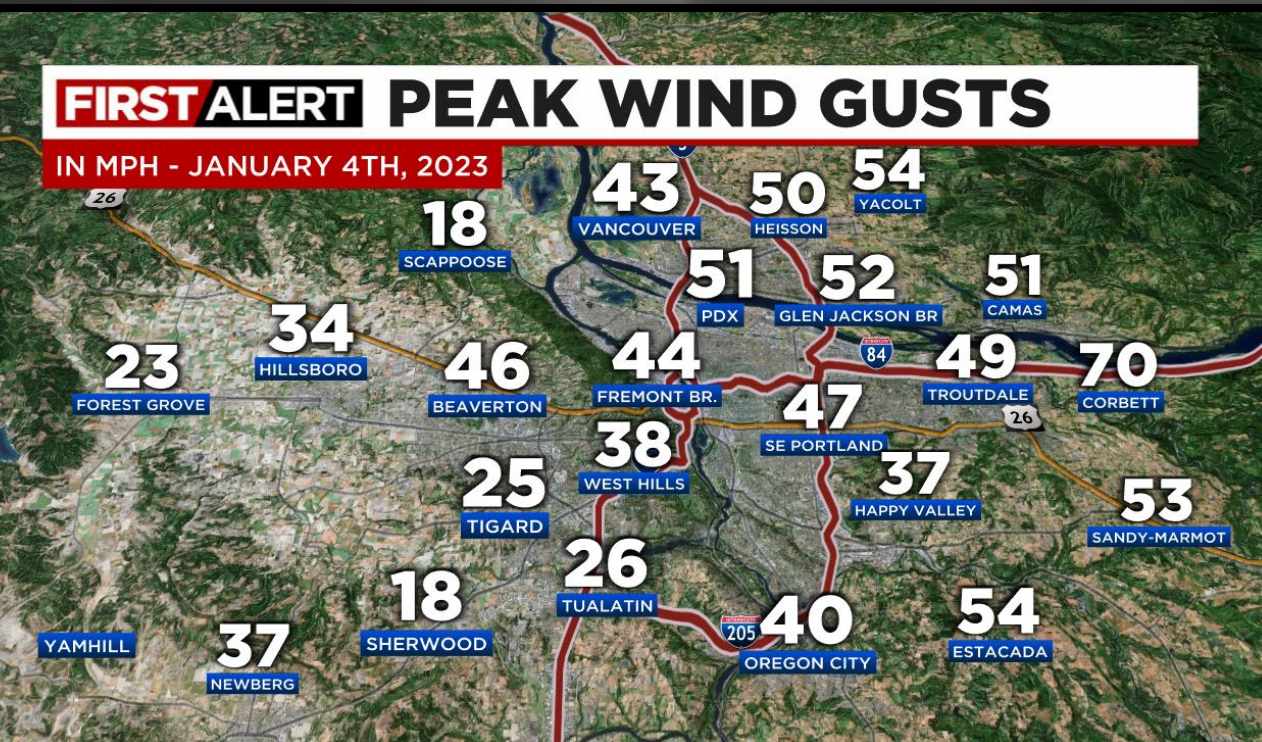
# EASTERLY DOWNSLOPE WINDSTORM ON 4TH

**“BOMB CYCLONE”  
FAR  
OFFSHORE  
BIG PRESSURE  
DIFFERENCE  
EAST TO WEST**

DD/HH	EUG- PDX	PDX- SEA	OTH- GEG	EUG- RDM	HQM- OLM	AST- PDT	AST- PDX	PDX- PDT	AST- DLS	PDX- DLS	PDX- TTD	TTD- DLS
05/18	+0.5	-0.2	-11.0	-5.6	-2.9	-10.8	-3.5	-7.3	-12.2	-8.7	-0.5	-8.2
05/16	+0.6	-1.9	-13.7	-6.9	-1.7	-10.5	-2.2	-8.3	-12.0	-9.8	-1.8	-8.0
05/14	-1.4	-2.5	-16.8	-8.8	-2.8	-12.3	-3.4	-8.9	-13.5	-10.1	-1.5	-8.6
05/12	-2.1	-2.6	-18.7	-8.6	-2.5	-13.4	-3.6	-9.8	-13.7	-10.1	-2.0	-8.1
05/10	-1.1	-2.7	-19.9	-7.9	-1.9	M	-1.9	M	-12.9	-11.0	-1.9	-9.1
05/08	-2.2	-1.6	-21.5	-10.0	-1.1	-10.4	-1.6	-8.8	-12.4	-10.8	-1.3	-9.5
05/06	-2.9	-4.4	-22.0	-11.5	-2.7	-13.4	-1.8	-11.6	-14.3	-12.5	-2.6	-9.9
05/04	-3.7	-3.9	-23.6	-12.6	-3.7	-15.4	-3.4	-12.0	-16.0	-12.6	-2.3	-10.3
05/02	-3.5	-5.2	-24.7	-12.8	-4.0	-16.0	-3.6	-12.4	-16.6	-13.0	-2.7	-10.3
05/00	-4.4	-3.3	-24.6	-11.8	-2.8	-14.2	-3.5	-10.7	-15.6	-12.1	-1.8	-10.3
04/22	-4.8	-1.7	-24.6	-9.6	-3.0	-12.5	-3.9	-8.6	-13.9	-10.0	-1.7	-8.3
04/20	-3.2	-2.7	-23.7	-10.1	-3.0	-13.7	-4.4	-9.3	-15.2	-10.8	-1.3	-9.5
04/18	-2.6	-3.1	-22.7	-8.4	-2.3	-12.7	-3.3	-9.4	-14.0	-10.7	-1.5	-9.2

## FIRST ALERT PEAK WIND GUSTS

IN MPH - JANUARY 4TH, 2023





# BRIEF COLD SPELL LATE JANUARY

## MODELS VERY COLD AT ONE POINT

Still ended up with coldest airmass of season  
@ 850mb (-9.3 C) on Salem sounding 29th

**12Z ECMWF**

(PDX - ENTIRE RUN)

Image Created:

2:41 PM

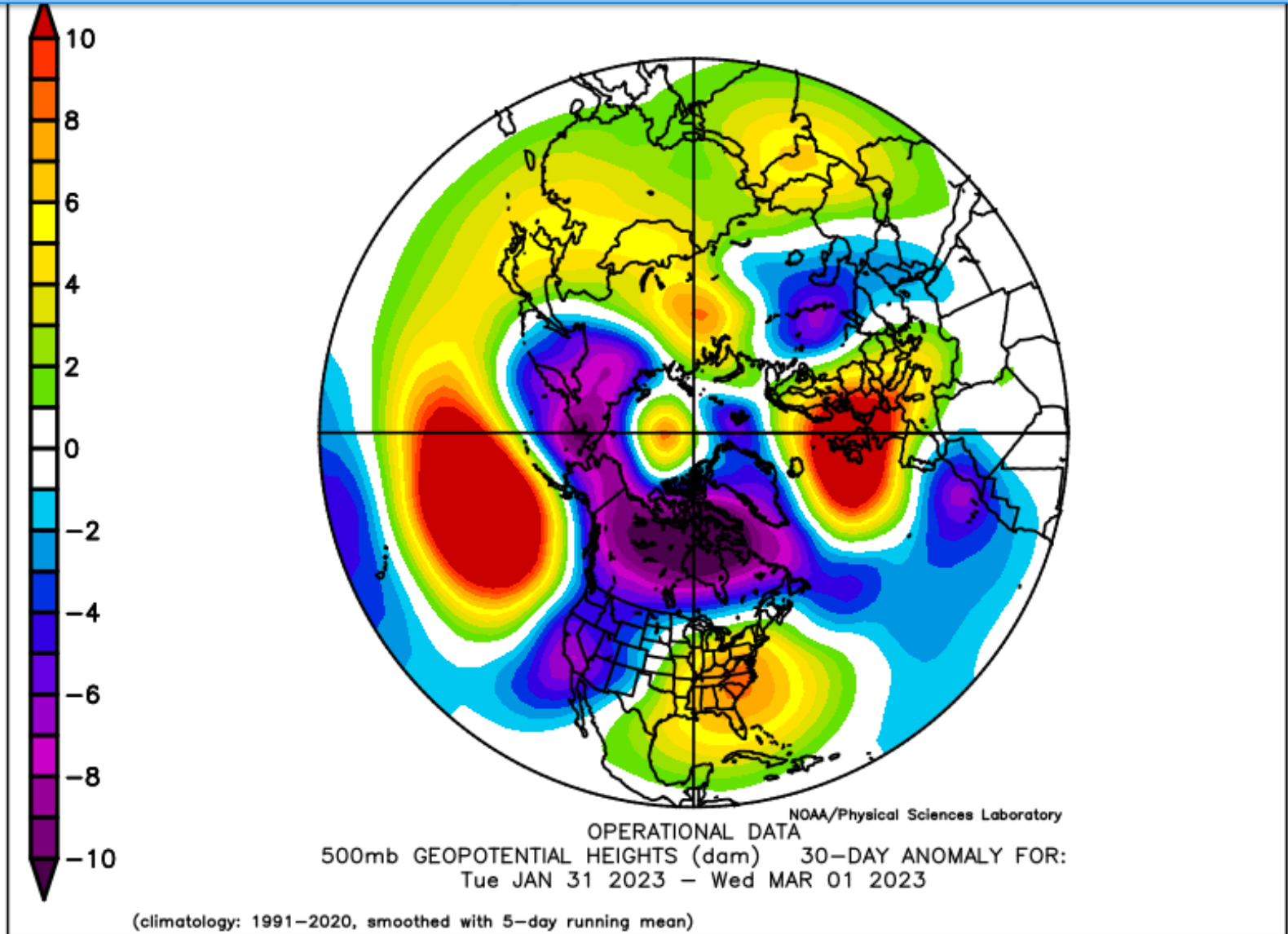
1/24/2023

		TEMP	DEWP	SFC WND	850 WND	850 T	SLP	PRECIP	SNOW	ICE	CAPE	% CLD
TUESDAY	4:00 PM	46	39	E 3	N 28	-0.3	1037	.00	.0	.0	0	100
TUESDAY	10:00 PM	41	39	N 2	N 18	-0.3	1038	.00	.0	.0	20	100
WEDNESDAY	4:00 AM	41	39	W 0	N 20	1.6	1038	.01	.0	.0	20	95
WEDNESDAY	10:00 AM	45	42	N 5 g 8	N 27	4.2	1039	.01	.0	.0	20	97
WEDNESDAY	4:00 PM	47	42	E 3	NE 12	6.1	1038	.01	.0	.0	0	97
WEDNESDAY	10:00 PM	37	36	NW 4	N 11	6.9	1038	.01	.0	.0	0	42
THURSDAY	4:00 AM	37	36	NE 0	N 23	5.8	1038	.01	.0	.0	20	96
THURSDAY	10:00 AM	40	37	N 4 g 10	N 25	5.9	1039	.01	.0	.0	20	100
THURSDAY	4:00 PM	44	39	SE 4	NW 34	7.5	1036	.01	.0	.0	0	100
THURSDAY	10:00 PM	42	39	SW 4 g 8	NW 25	1.3	1033	.01	.0	.0	20	100
FRIDAY	4:00 AM	43	41	SW 10g 20	NW 30	-0.7	1028	.02	.0	.0	20	100
FRIDAY	10:00 AM	45	43	SW 8 g 15	NW 23	-2.1	1025	.13	.0	.0	20	100
FRIDAY	4:00 PM	48	46	SW 5 g 9	NW 11	-1.2	1024	.15	.0	.0	20	98
FRIDAY	10:00 PM	42	41	S 3	SW 11	-2.2	1023	.16	.0	.0	20	93
SATURDAY	4:00 AM	41	40	W 5 g 10	SW 15	-4.6	1020	.18	.0	.0	20	74
SATURDAY	10:00 AM	41	39	SW 7 g 13	W 13	-4.0	1017	.18	.0	.0	20	86
SATURDAY	4:00 PM	41	40	S 6 g 12	W 10	-3.6	1012	.24	.0	.0	20	100
SATURDAY	10:00 PM	35	24	E 12g 22	E 47	-5.7	1015	.54	.7	.0	0	100
SUNDAY	4:00 AM	29	10	N 8 g 14	E 48	-8.4	1018	.54	.7	.0	0	0
SUNDAY	10:00 AM	29	6	N 9 g 19	E 56	-9.0	1022	.54	.7	.0	0	0
SUNDAY	4:00 PM	32	3	NE 11 g 19	E 43	-12.2	1023	.54	.7	.0	0	0
SUNDAY	10:00 PM	23	-3	NE 5 g 9	E 52	-14.0	1026	.54	.7	.0	0	0
MONDAY	4:00 AM	20	-8	NE 8 g 15	E 52	-16.2	1026	.54	.7	.0	0	0
MONDAY	10:00 AM	21	-12	NE 11 g 24	E 55	-15.7	1028	.54	.7	.0	0	0
MONDAY	4:00 PM	27	-13	NE 9 g 18	NE 42	-13.9	1027	.54	.7	.0	0	0
MONDAY	10:00 PM	21	-5	NE 7 g 13	NE 28	-10.1	1028	.54	.7	.0	0	0
TUESDAY	4:00 AM	19	0	NE 4 g 8	NE 15	-8.4	1028	.54	.7	.0	0	0
TUESDAY	10:00 AM	26	-4	NE 0 g 9	N 13	-7.1	1027	.54	.7	.0	0	76
TUESDAY	4:00 PM	34	-6	S 2	NW 21	-6.9	1024	.54	.7	.0	20	100
TUESDAY	10:00 PM	32	5	S 4	NW 21	-6.3	1024	.54	.7	.0	0	100
WEDNESDAY	4:00 AM	32	14	SE 3	NW 19	-4.9	1026	.54	.7	.0	20	100
WEDNESDAY	10:00 AM	34	22	SE 0	NW 11	-4.6	1029	.55	.8	.0	20	100
WEDNESDAY	4:00 PM	37	29	NE 0	NW 12	-4.2	1030	.55	.8	.0	20	100
WEDNESDAY	10:00 PM	32	28	NW 3	N 11	-3.7	1031	.55	.8	.0	20	100
THURSDAY	4:00 AM	28	27	N 3	E 5	-0.1	1031	.55	.8	.0	0	12
THURSDAY	10:00 AM	37	28	NE 4 g 10	S 6	2.0	1032	.55	.8	.0	0	100
THURSDAY	4:00 PM	43	36	NW 0	SW 13	3.1	1030	.55	.8	.0	0	100



# FEBRUARY

Anomalous ridging in eastern Pacific + cold trough over western USA developed 2<sup>nd</sup> half of month



# FIRST ALERT FEBRUARY 2023 IN PORTLAND

SUN	MON	TUE	WED	THU	FRI	SAT
			1 50°	2 50°	3 54°	4 50°
5 51°	6 51°	7 51°	8 54°	9 57°	10 55°	11 52°
12 51°	13 48°	14 45°	15 47°	16 49°	17 51°	18 53°
19 51°	20 53°	21 50°	22 38°	23 31°	24 36°	25 43°
26 42°	27 42°	28 39°				

**-2.9°**  
from normal

VERY COLD  
LAST WEEK  
OF THE MONTH



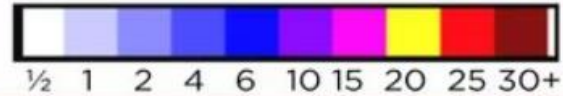
# FEBRUARY

Valentine's Day snow for some

**FIRST ALERT**

## SNOW FORECAST

(IN INCHES) GRAF MODEL



ENDING 4:00 AM THURSDAY

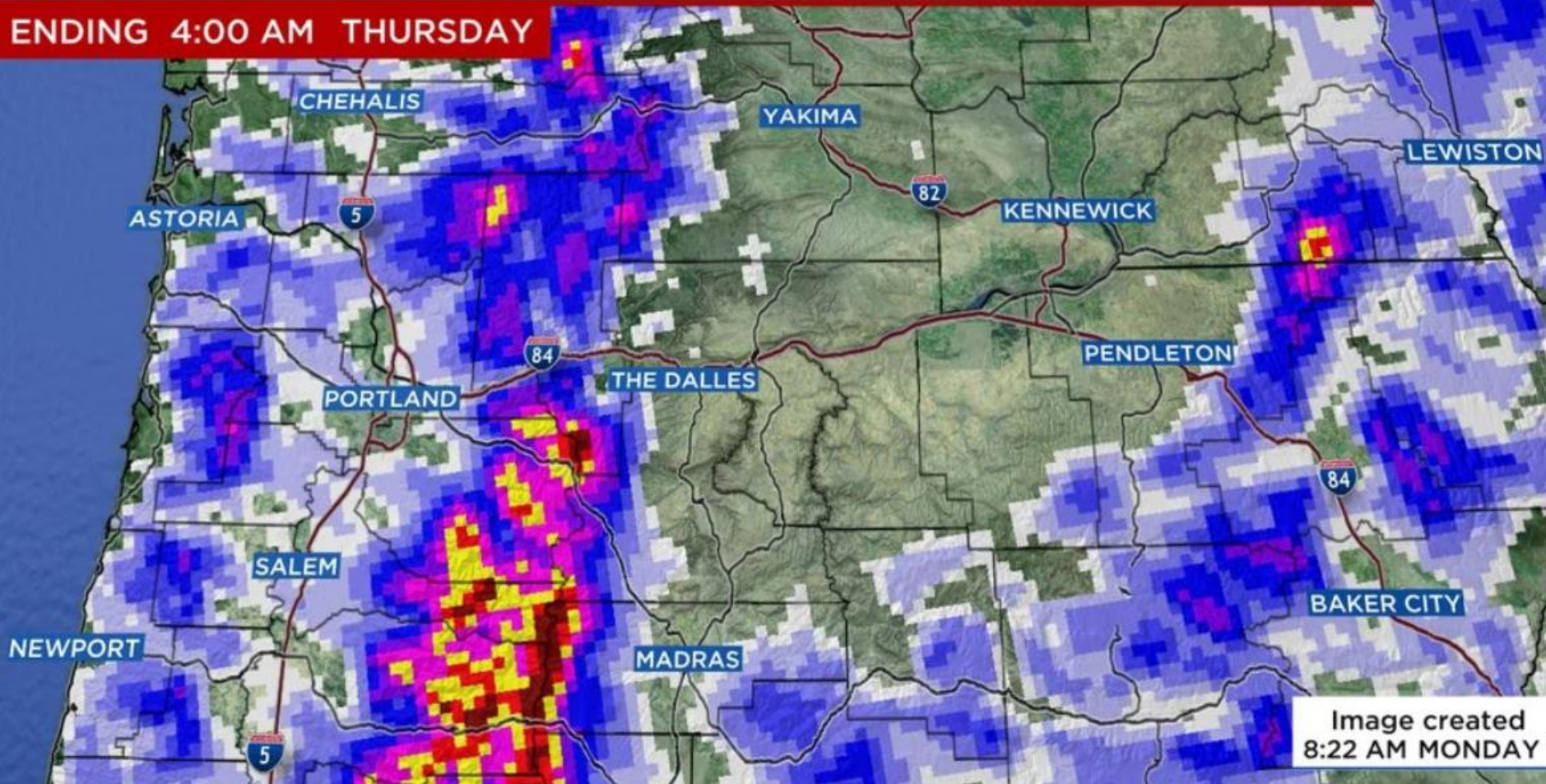


Image created  
8:22 AM MONDAY

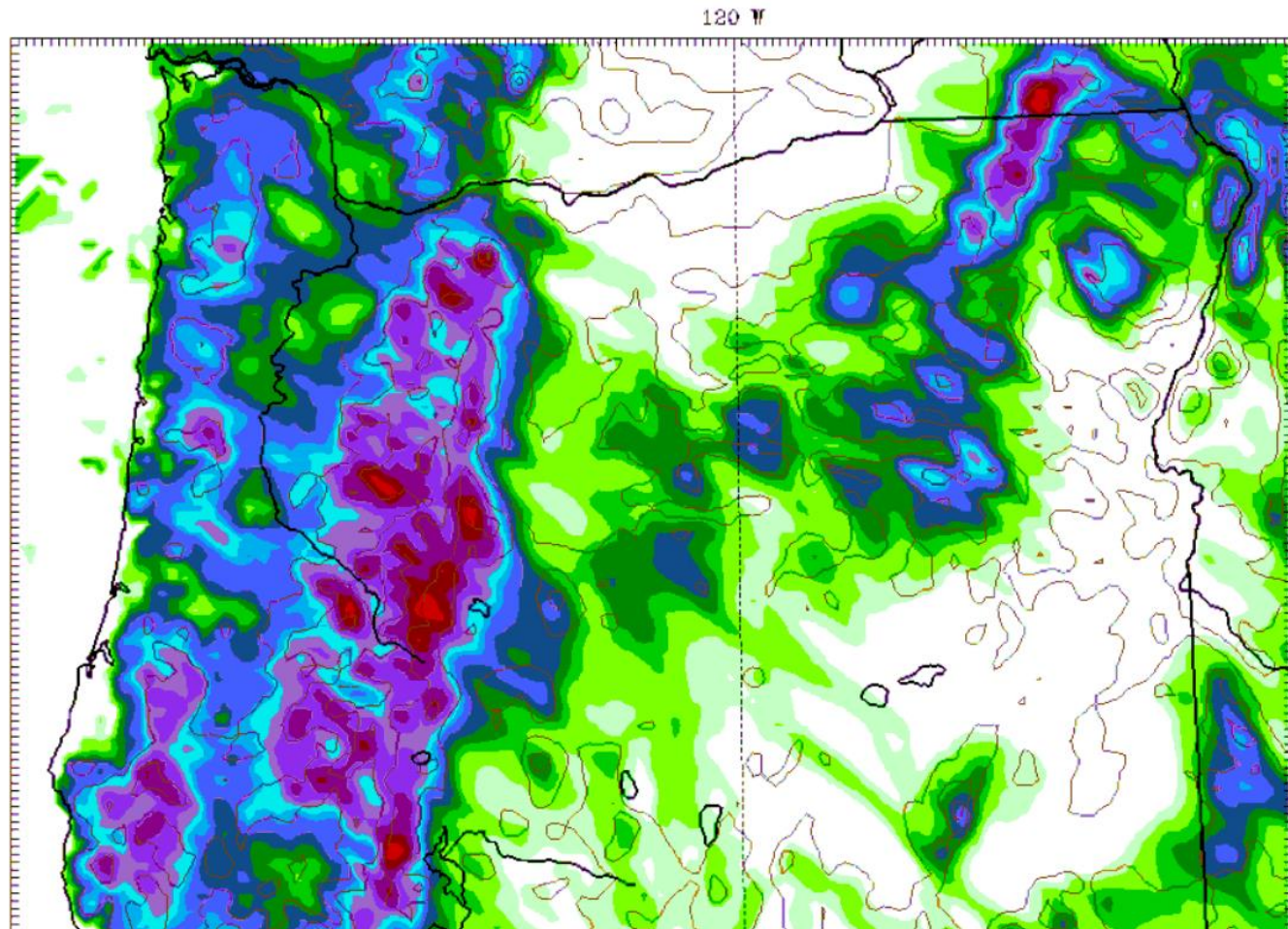


# FEBRUARY

Valentine's Day snow for some

UW WRF-GFS 4km Domain  
Fest: 36 h  
24HR Snowfall (in)  
Terrain height AMSL

Init: 12 UTC Mon 13 Feb 23  
Valid: 00 UTC Wed 15 Feb 23 (16 PST Tue 14 Feb 23)



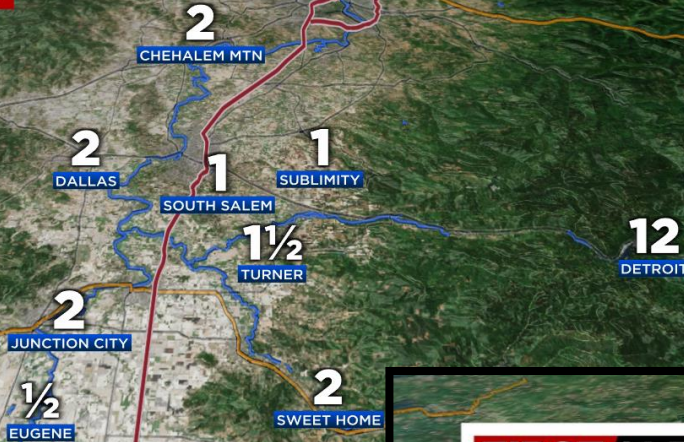


# FEBRUARY

Valentine's Day snow for some

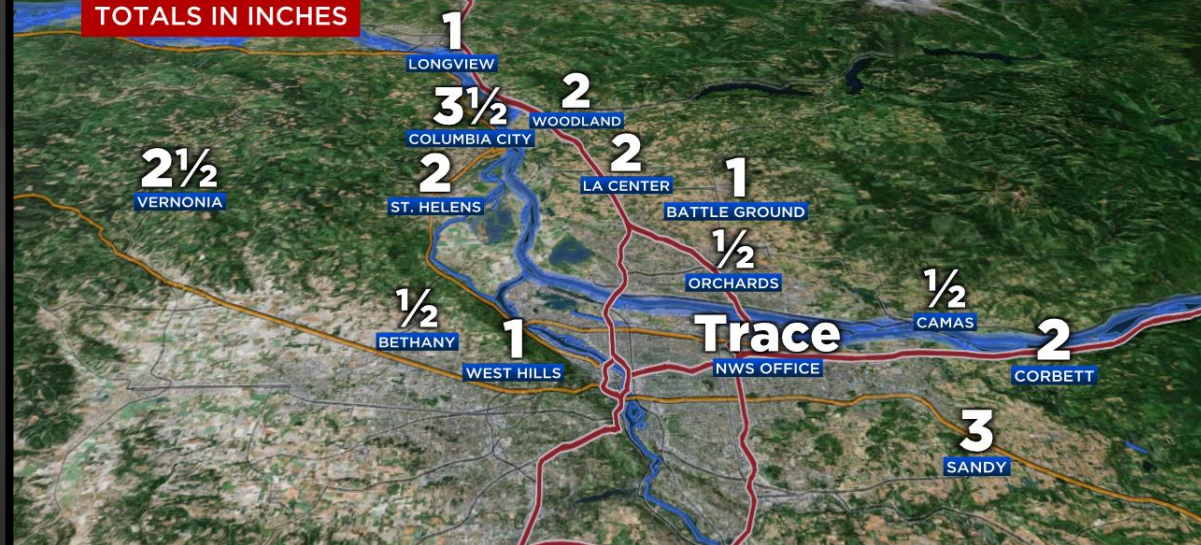
## FIRST ALERT SNOW TOTALS TODAY

TOTALS IN INCHES



## FIRST ALERT SNOW TOTALS TODAY

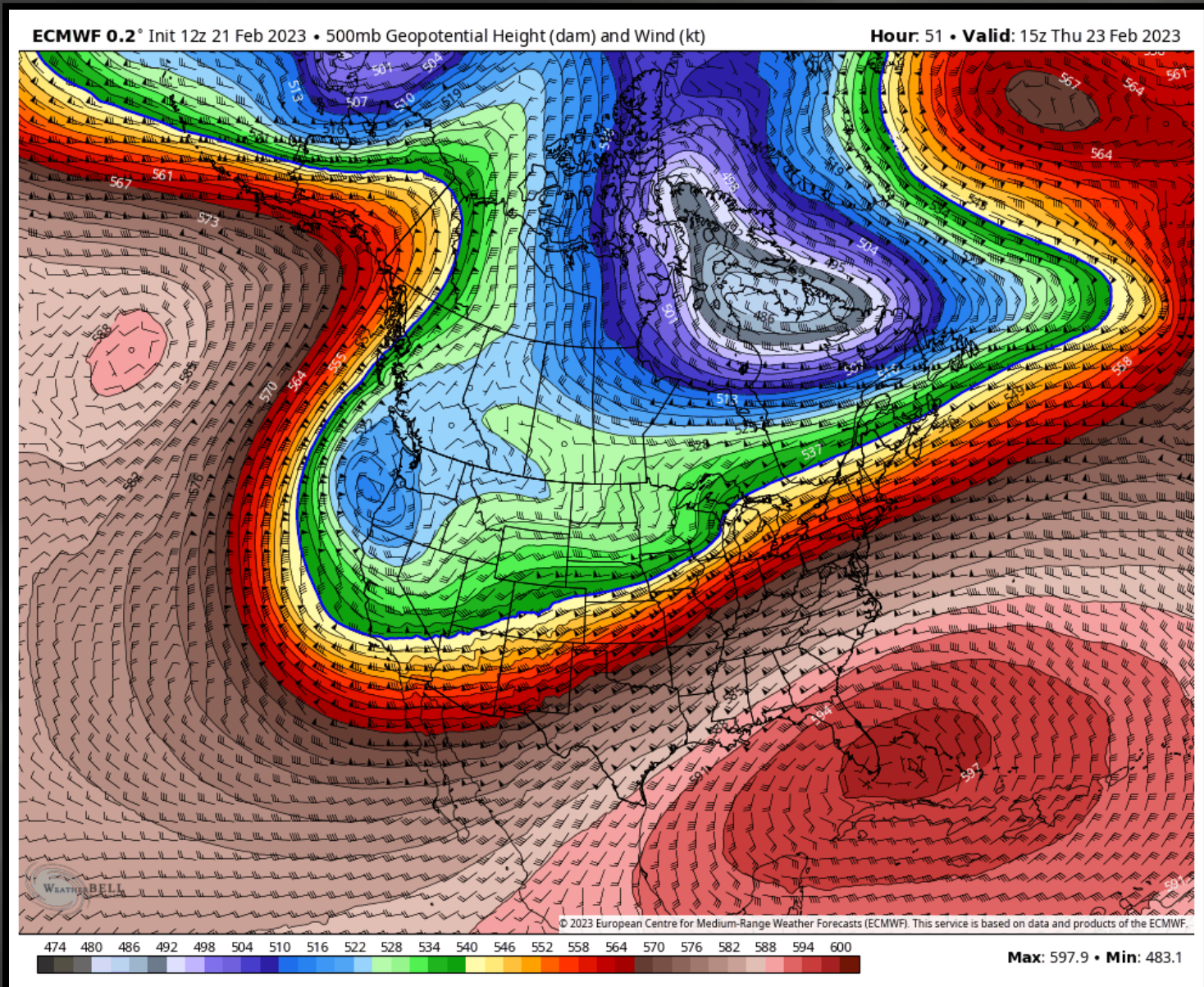
TOTALS IN INCHES





# FEBRUARY

3<sup>rd</sup> episode of cold upper-trouching drops through region last week of the month

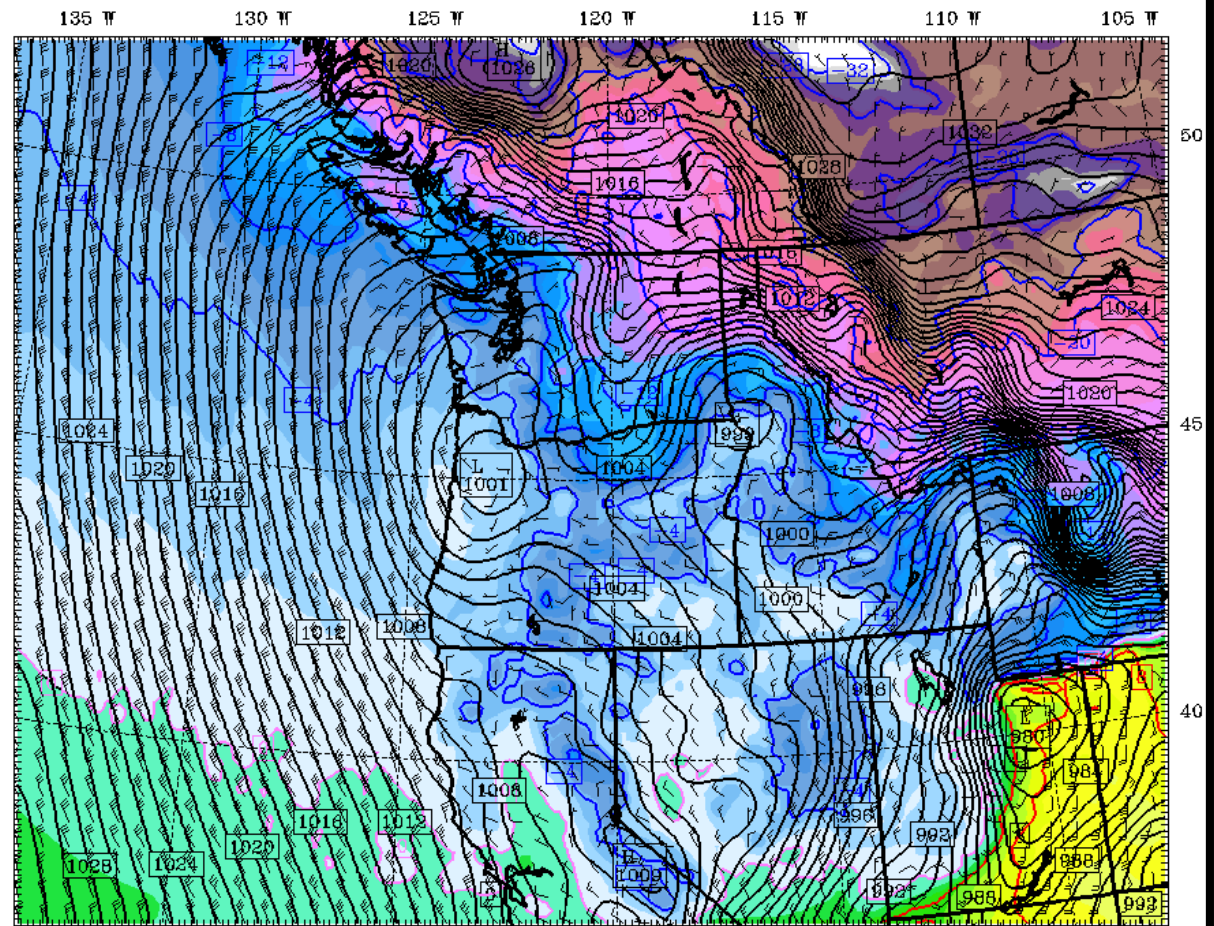


A “perfect setup” with surface low lingering near coastline  
w/east wind drawing in cold/dry air

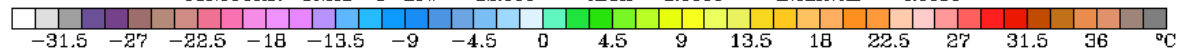
4 a.m.  
Wednesday  
Forecast

UW WRF-GFS 12km Domain  
Fcst: 24 h  
Temperature at 925 mb (°C)  
Sea Level Pressure (hPa)  
Wind at 10m (full barb = 10kts)

Init: 12 UTC Tue 21 Feb 23  
Valid: 12 UTC Wed 22 Feb 23 (04 PST Wed 22 Feb 23)



CONTOURS: UNITS=hPa LOW= 981.00 HIGH= 1033.0 INTERVAL= 1.0000  
CONTOURS: UNITS=°C LOW= -32.000 HIGH= 8.0000 INTERVAL= 4.0000

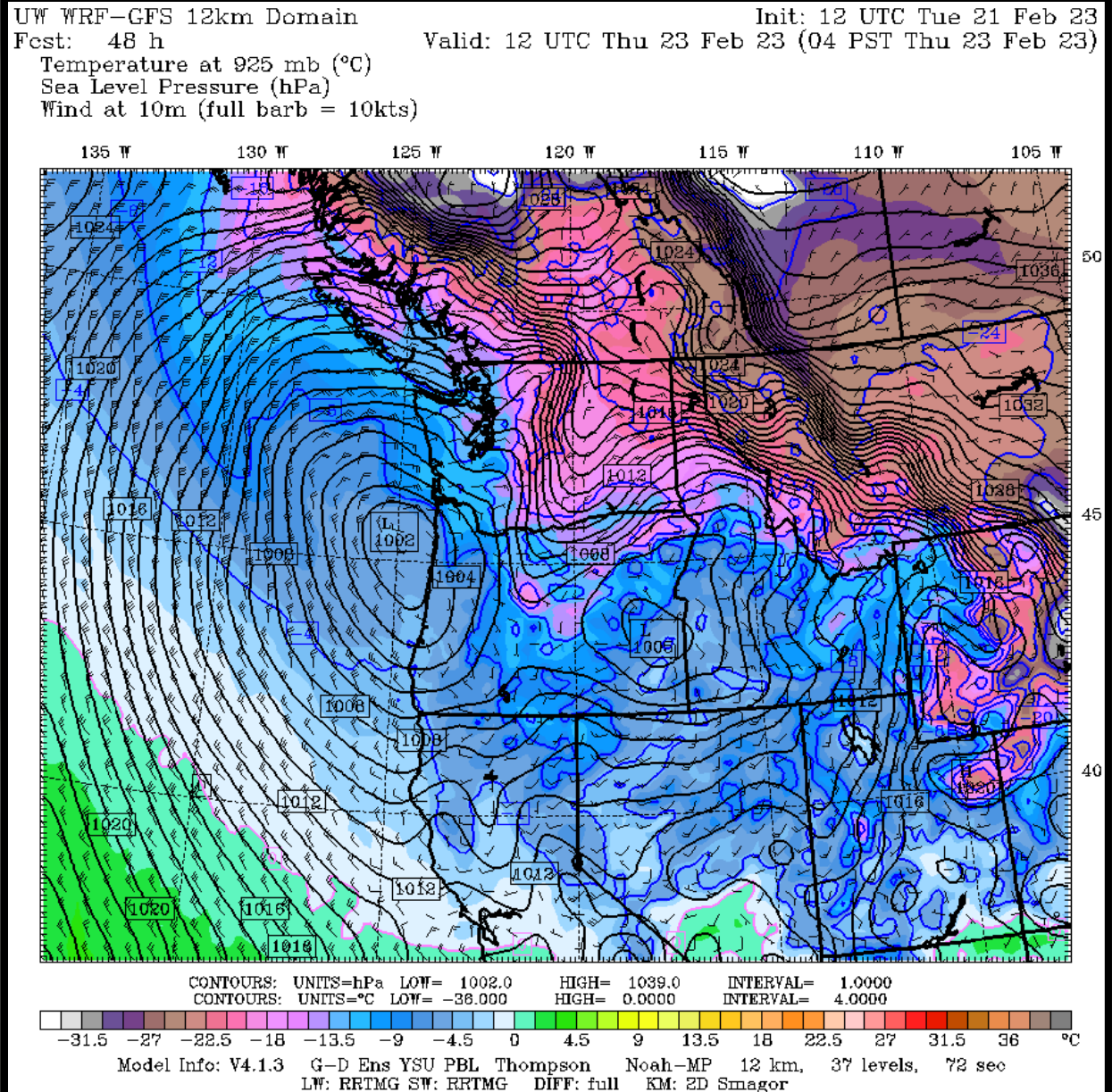


Model Info: V4.1.3 G-D Ens YSU PBL Thompson Noah-MP 12 km, 37 levels, 72 sec  
LW: RRTMG SW: RRTMG DIFF: full KM: 2D Smagor



st setup"; surface low lingering near coastline  
w/east wind drawing in cold/dry air

# 4 a.m. Thursday Forecast



A “perfect setup”; surface low lingering near coastline  
w/east wind drawing in cold/dry air

## 18Z GRAF (IBM)

PORTLAND

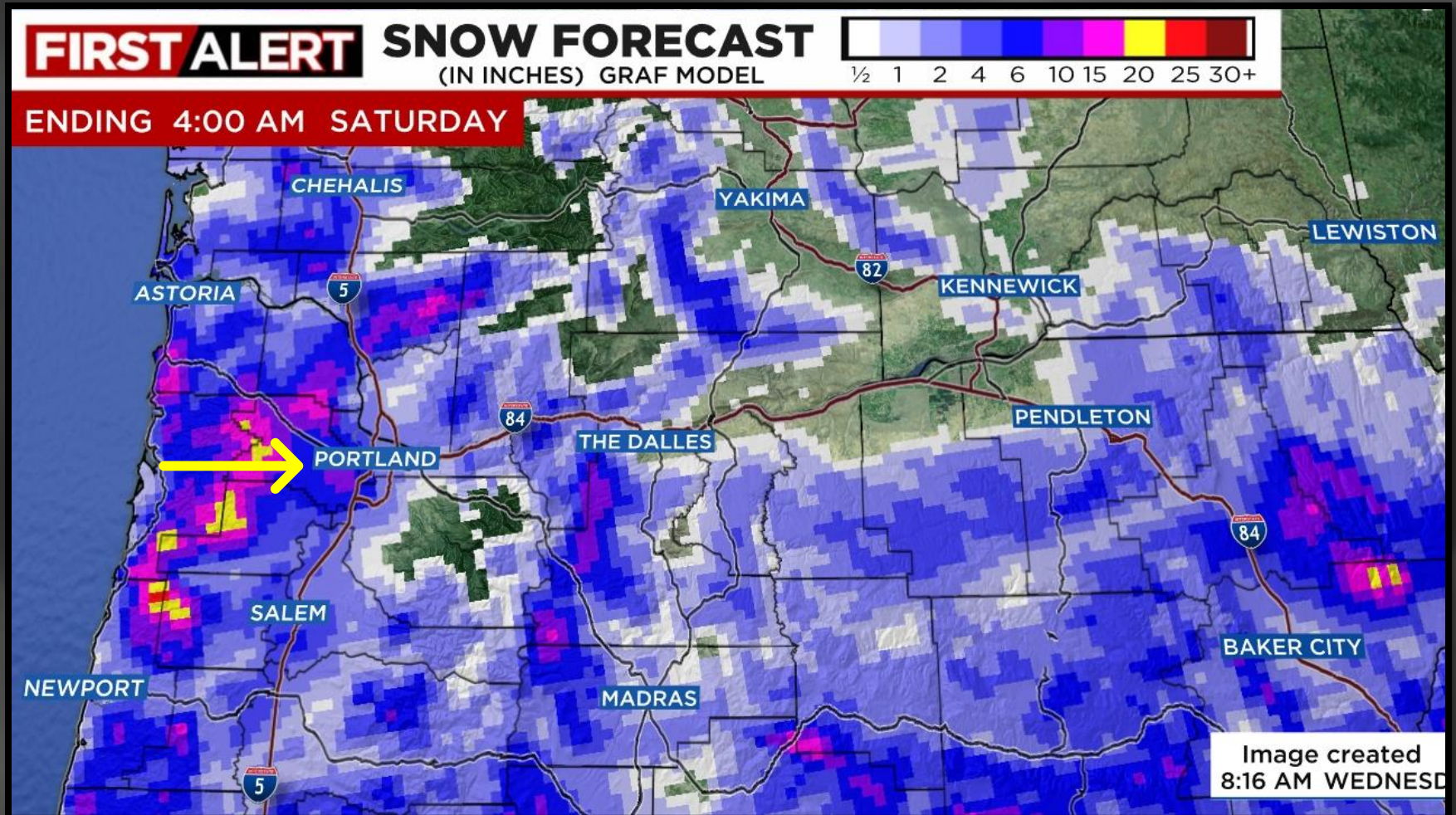
Image Created: 1:35 PM 2/21/2023

		TEMP	DEW	SFC W	+ GUST	850 WND	SLP	PRECIP	SNOW	ICE	CAPE	% CLD
TUESDAY	4:00 PM	42	33	W 9	15	NW 31	1003	.13	0	0	0	87
TUESDAY	6:00 PM	39	35	SW 4		NW 27	1002	.18	0	0	0	100
TUESDAY	8:00 PM	37	35	W 7	13	NW 26	1002	.23	0	0	0	100
TUESDAY	10:00 PM	37	34	SW 6	9	NW 25	1002	.23	0	0	0	100
WEDNESDAY	12:00 AM	37	35		6 10	W 19	1002	.23	0	0	20	100
WEDNESDAY	2:00 AM	35	31	S 7	12	W 15	1002	.23	0	0	0	100
WEDNESDAY	4:00 AM	34	32	S 10	17	SW 9	1001	.23	0	0	0	100
WEDNESDAY	6:00 AM	34	33	S 11	19	S 11	1002	.23	0	0	0	100
WEDNESDAY	8:00 AM	35	32	S 10	17	S 13	1002	.27	0	0	0	100
WEDNESDAY	10:00 AM	36	33	S 12	20	S 17	1002	.28	0	0	0	100
WEDNESDAY	12:00 PM	35	32	SE 11	19	S 18	1002	.38	.4	0	0	100
WEDNESDAY	2:00 PM	37	34	SE 11	19	S 19	1002	.43	.5	0	0	100
WEDNESDAY	4:00 PM	34	33	E 12	19	S 31	1001	.59	1.0	0	0	100
WEDNESDAY	6:00 PM	33	30	E 14	22	SW 27	1002	.81	2.8	0	0	100
WEDNESDAY	8:00 PM	31	25	E 14	22	S 23	1004	.98	4.1	0	0	100
WEDNESDAY	10:00 PM	29	24	E 15	23	S 25	1006	1.04	4.3	0	0	100
THURSDAY	12:00 AM	29	20	E 14	23	S 27	1006	1.04	4.6	0	0	100
THURSDAY	2:00 AM	27	18	E 16	26	S 27	1006	1.04	4.6	0	0	100
THURSDAY	4:00 AM	26	16	E 19	31	S 27	1007	1.04	4.6	0	0	100
THURSDAY	6:00 AM	24	14	E 23	36	SE 23	1008	1.04	4.6	0	0	100
THURSDAY	8:00 AM	24	11	E 23	36	SE	1009	1.04	4.7	0	0	100
THURSDAY	10:00 AM	26	14	E 20	31	SE 23	1010	1.04	4.7	0	0	75
THURSDAY	1:00 PM	29	16	E 21	32	SE 31	1011	1.04	4.7	0	0	94
THURSDAY	4:00 PM	29	15	E 18	29	E 31	1011	1.04	4.7	0	0	0
THURSDAY	7:00 PM	24	11	E 16	27	E 29	1013	1.04	4.7	0	0	0
THURSDAY	10:00 PM	24	11	E 17	29	E 29	1015	1.04	4.7	0	0	11
FRIDAY	1:00 AM											
FRIDAY	4:00 AM											

Models had the basic synoptic situation correct, but  
widely varying precipitation forecasts

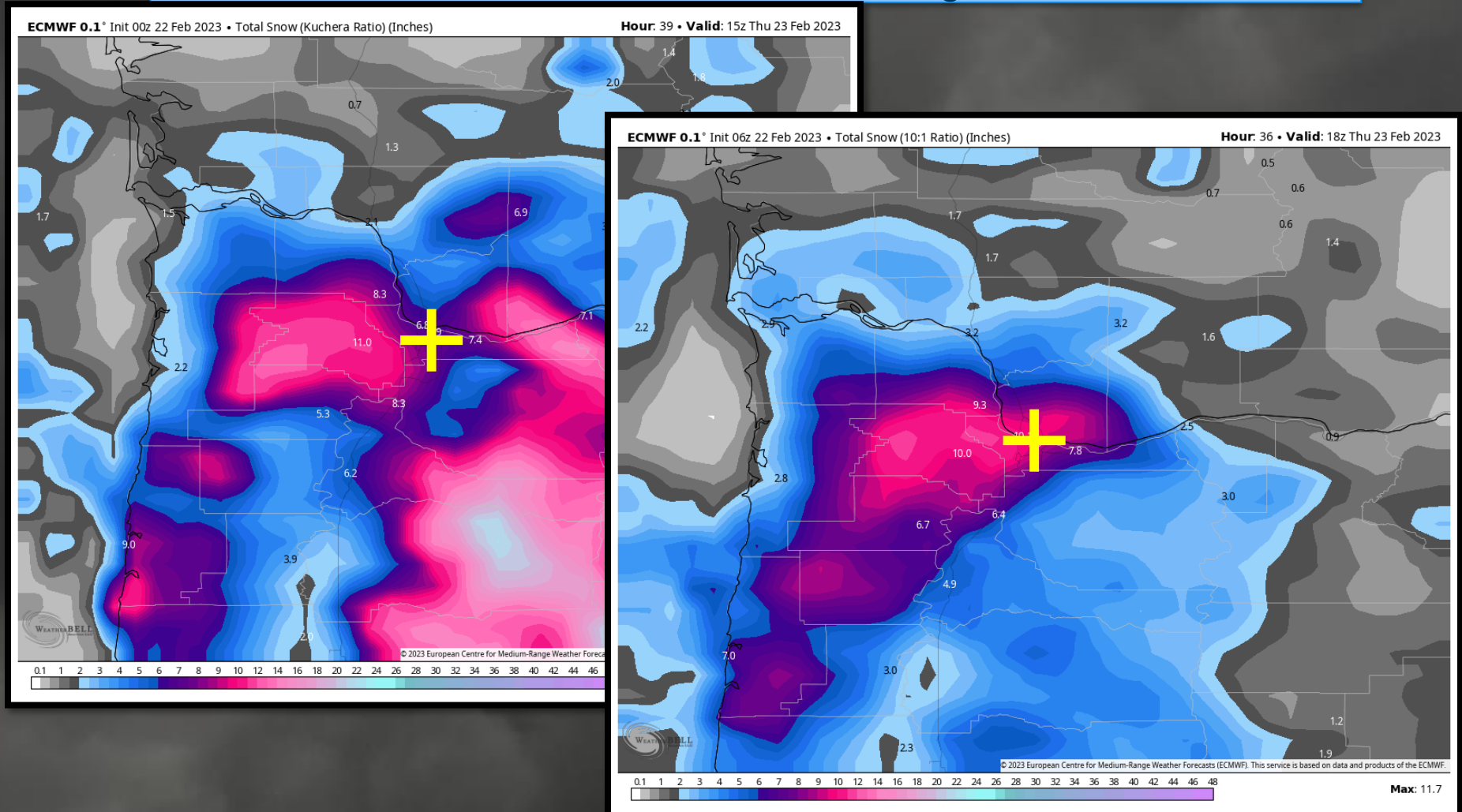


Forecast available 8am Wednesday, T-8 hours to gridlock



Strong hints from several models that “something big may happen”

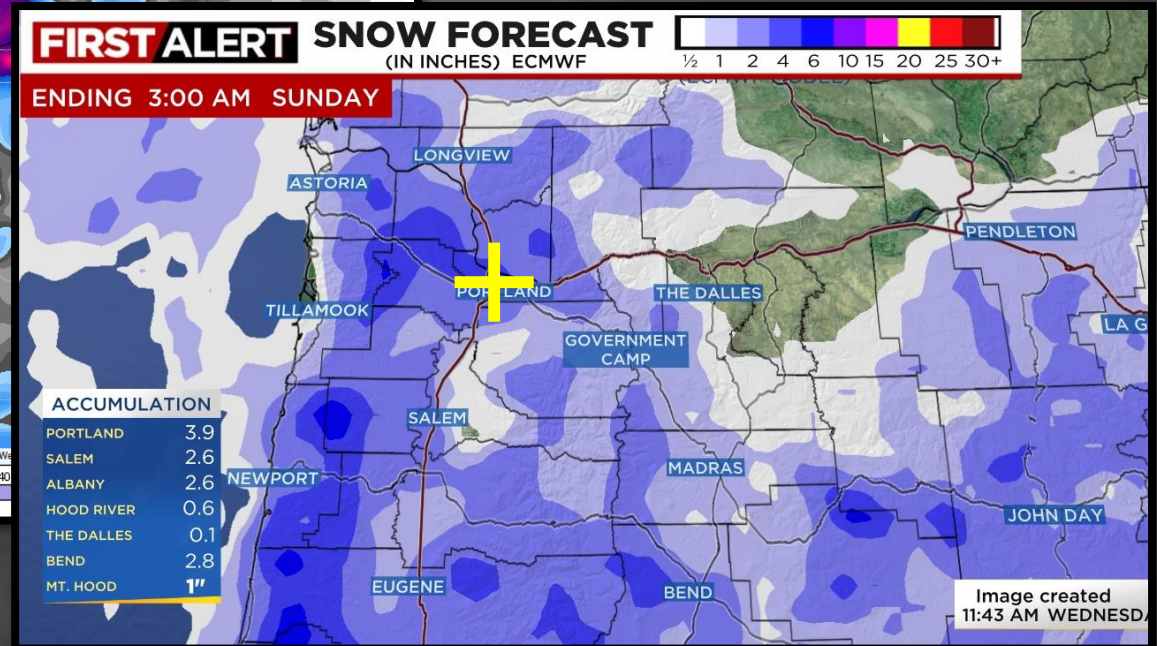
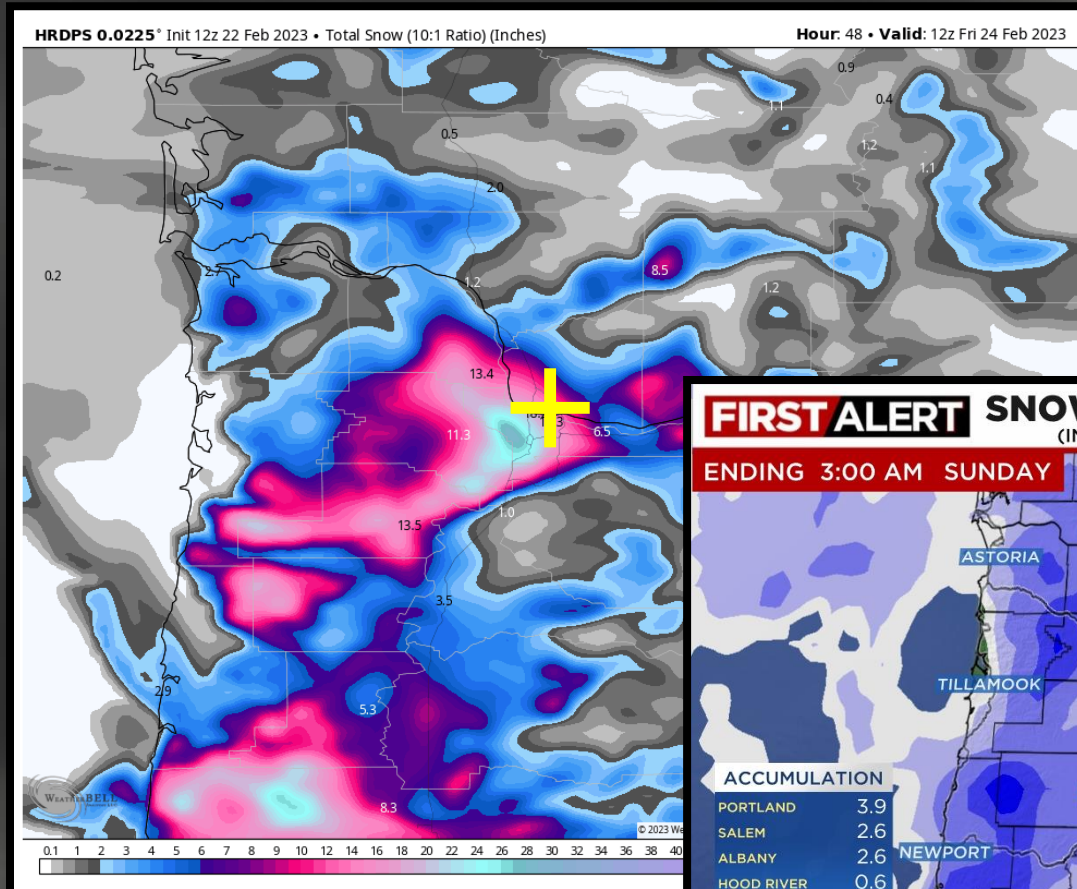
## Euro forecasts 00z and 06z night before



Strong hints from several models that “something big may happen”

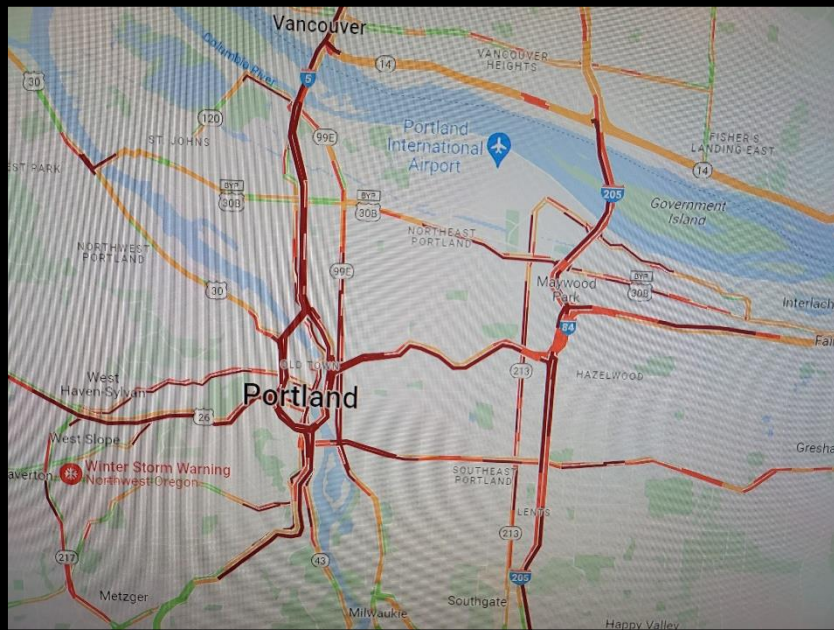


## Canadian (HRDPS) 12z & final Euro 12z



Strong hints from several models that “something big may happen”

# Gridlock for hours, then a snowy/frozen city the next day



**LIVE**  
**ODOT**  
**CAM**

**205 @ GOVERNMENT ISLAND**  
NE PORTLAND

Govt Island



## SNOW ARRIVES AT BEACHES NIGHT OF 22<sup>nd</sup> into 23<sup>rd</sup>



**FEBRUARY 24<sup>th</sup>**

**FIRST ALERT**

# **SNOW COVER FROM SPACE**

**MIDDAY FRIDAY**

PORTLAND

CANBY

WOODBURN

SALEM

ALBANY





**FEBRUARY 24<sup>th</sup>**

**FIRST ALERT SNOW COVER FROM SPACE**

**MIDDAY FRIDAY**

**KELSO**

**TILLAMOOK  
VALLEY**

**HILLSBORO**

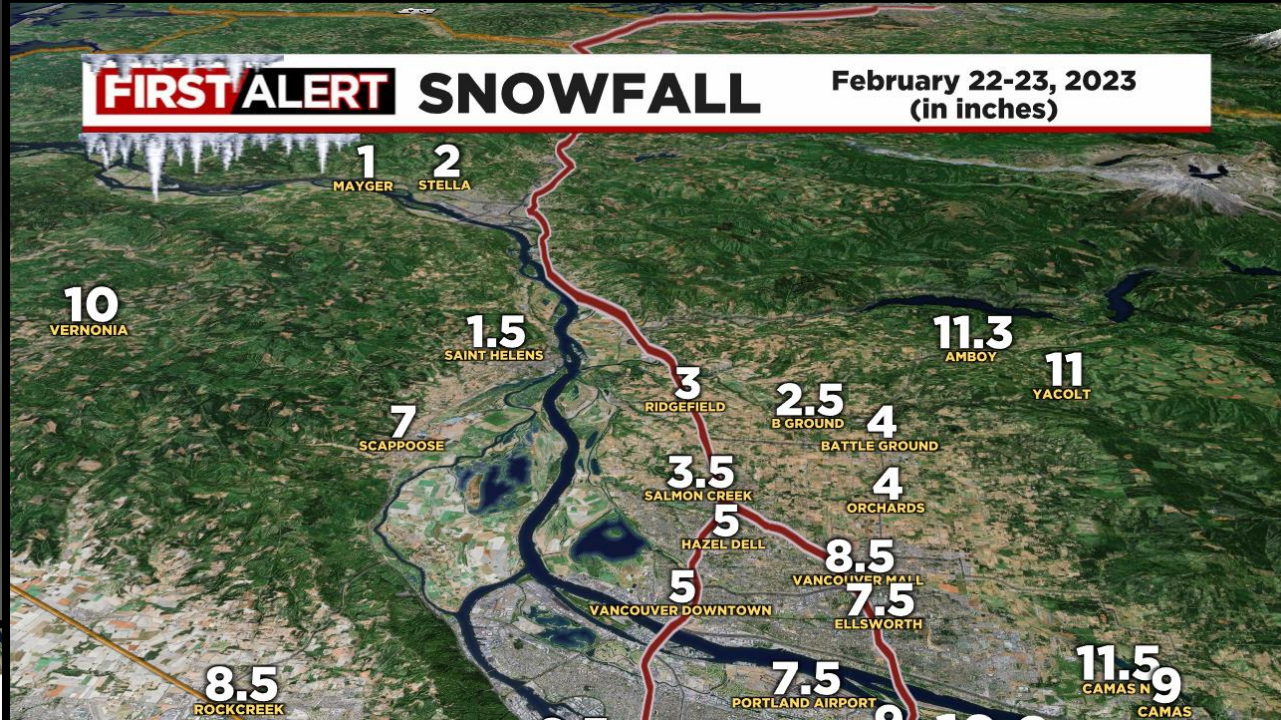
**PORTLAND**



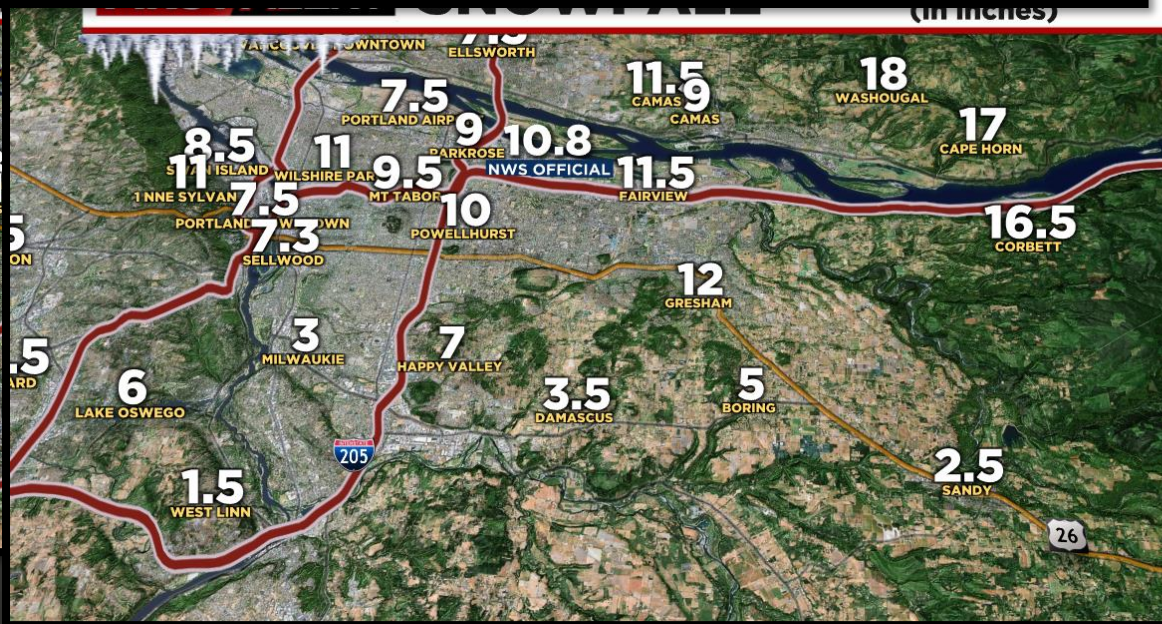
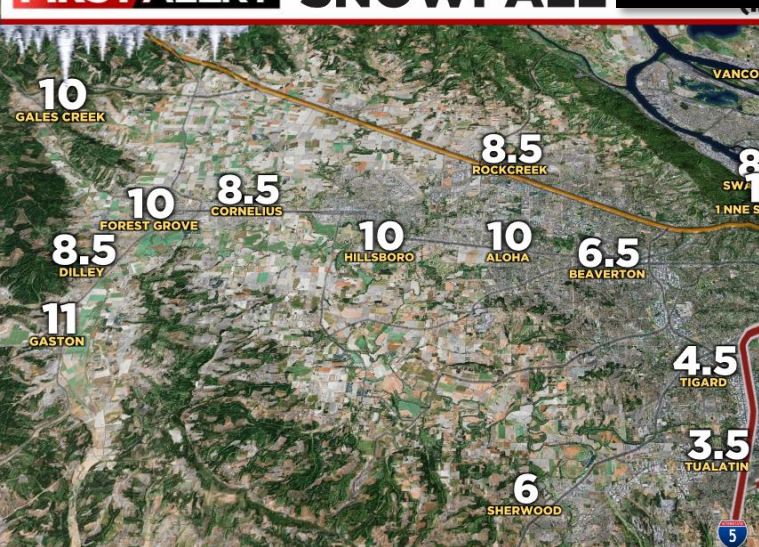


# FIRST ALERT SNOWFALL

February 22-23, 2023  
(in inches)



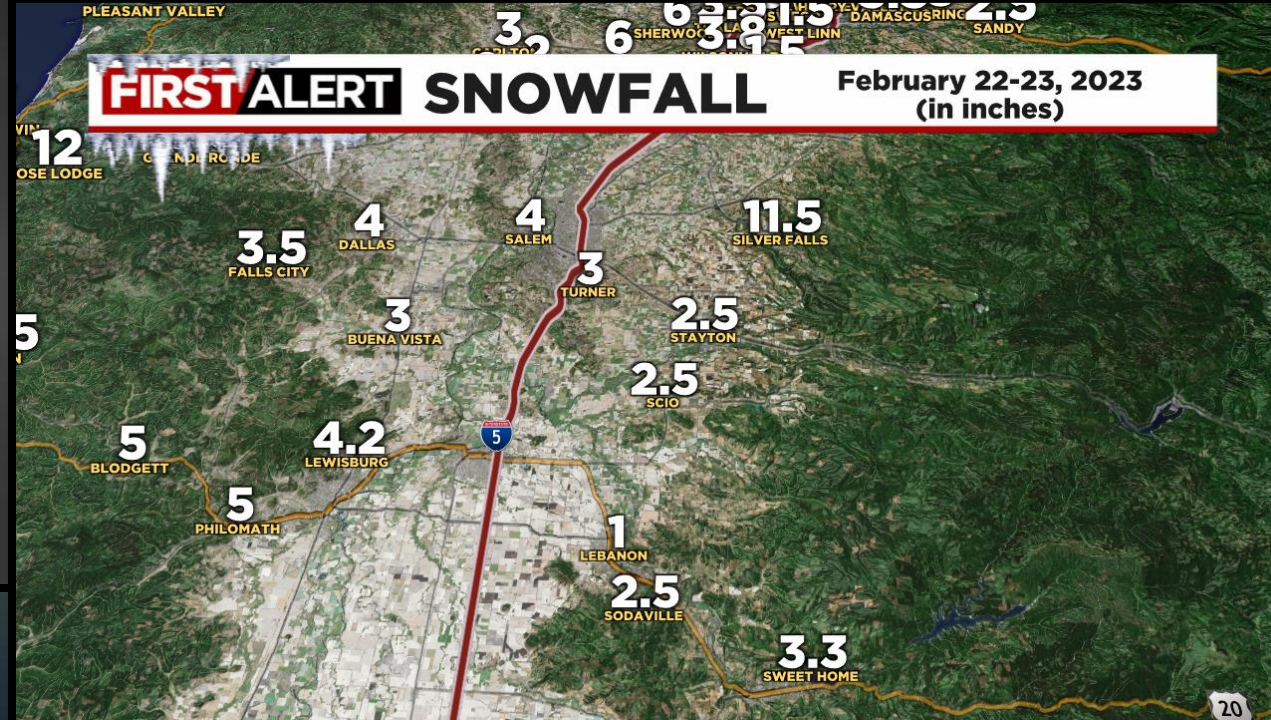
# FIRST ALERT SNOWFALL





# FIRST ALERT SNOWFALL

February 22-23, 2023  
(in inches)



# SNOWFALL

February 22-23, 2023  
(in inches)





# FEBRUARY 25TH

Coldest morning of winter for most of us  
Calm + clear + 3-8" snow on ground

## FIRST ALERT MORNING LOW TEMPS

IN METRO AREA





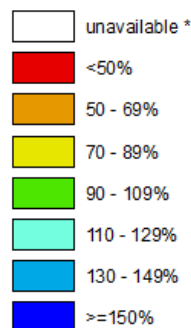
# Snowpack looking good!

La Nina delivering this year

## Oregon SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Mar 14, 2023

Current Snow Water Equivalent (SWE)  
Basin-wide Percent  
of 1991-2020 Median

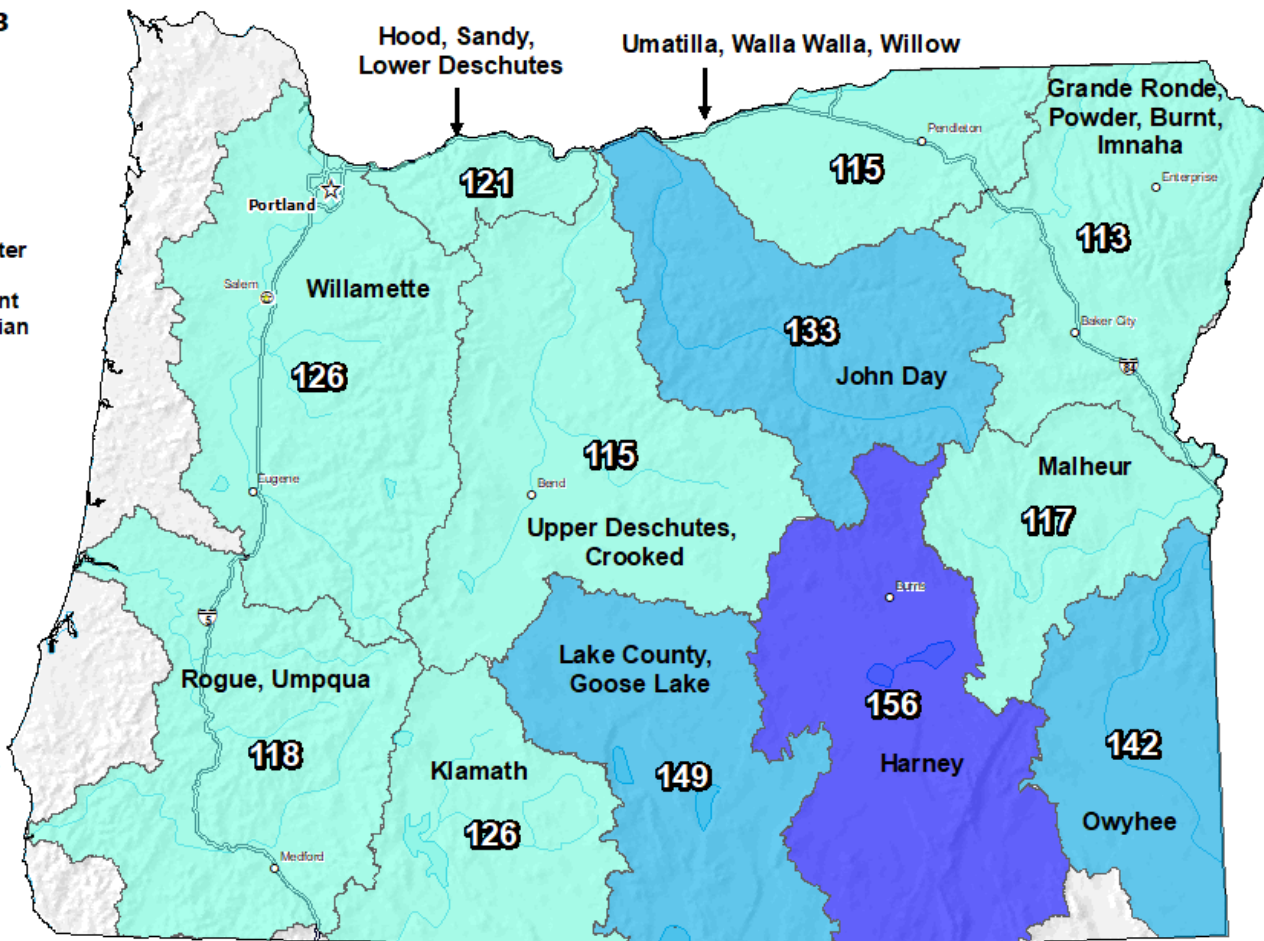


\* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional Data  
Subject to Revision



The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).



0 10 20 40 60 80 100 Miles

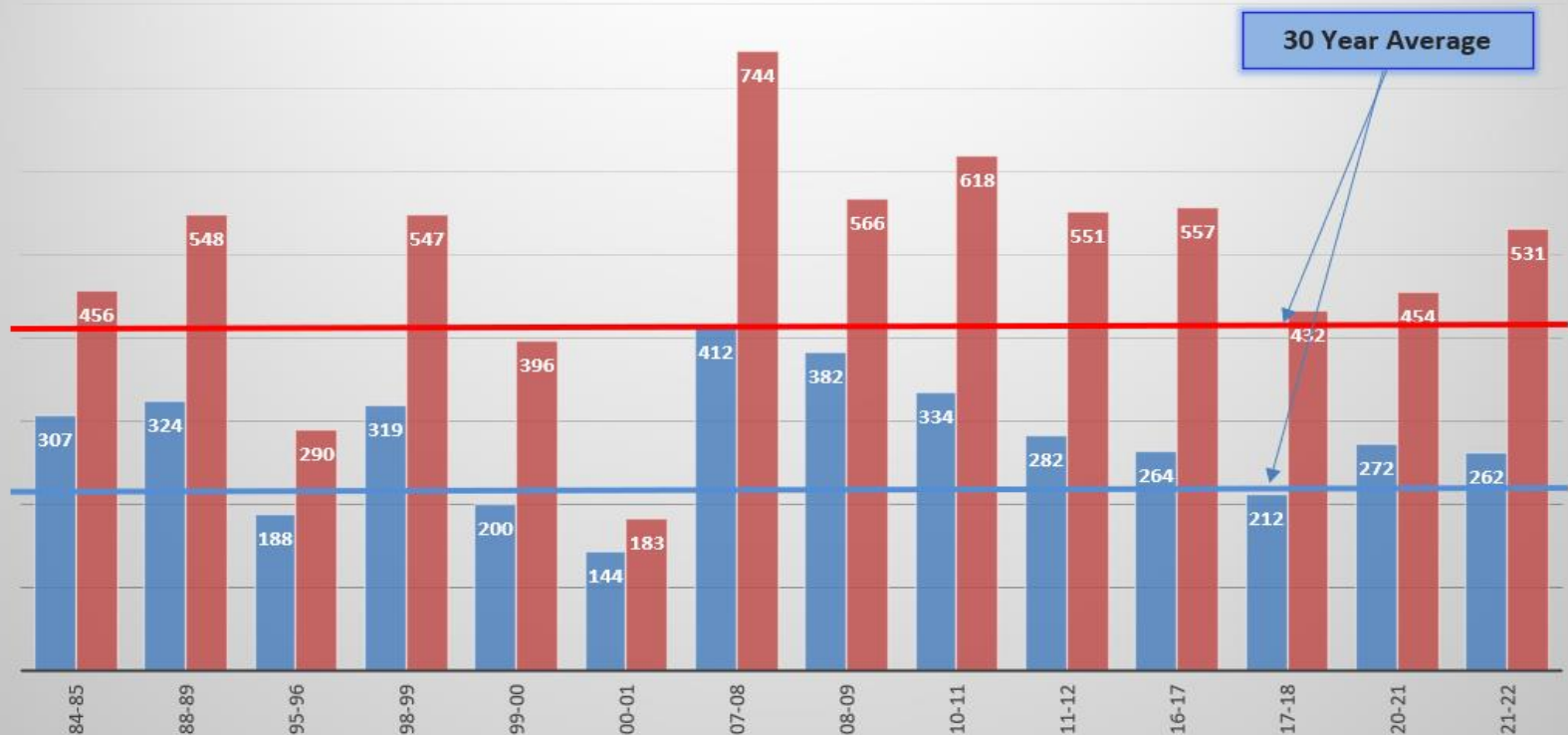
Prepared by:  
USDA/NRCS National Water and Climate Center  
Portland, Oregon  
<https://www.nrcs.usda.gov/wps/portal/wcc/home/>

# Cascade Snowfall

1. Early ski season start with cold November
2. Best weeks of winter end of February and early March
3. MISSING snow totals February at Government Camp!

## Winter Snowfall On Mt. Hood During La Nina Winters

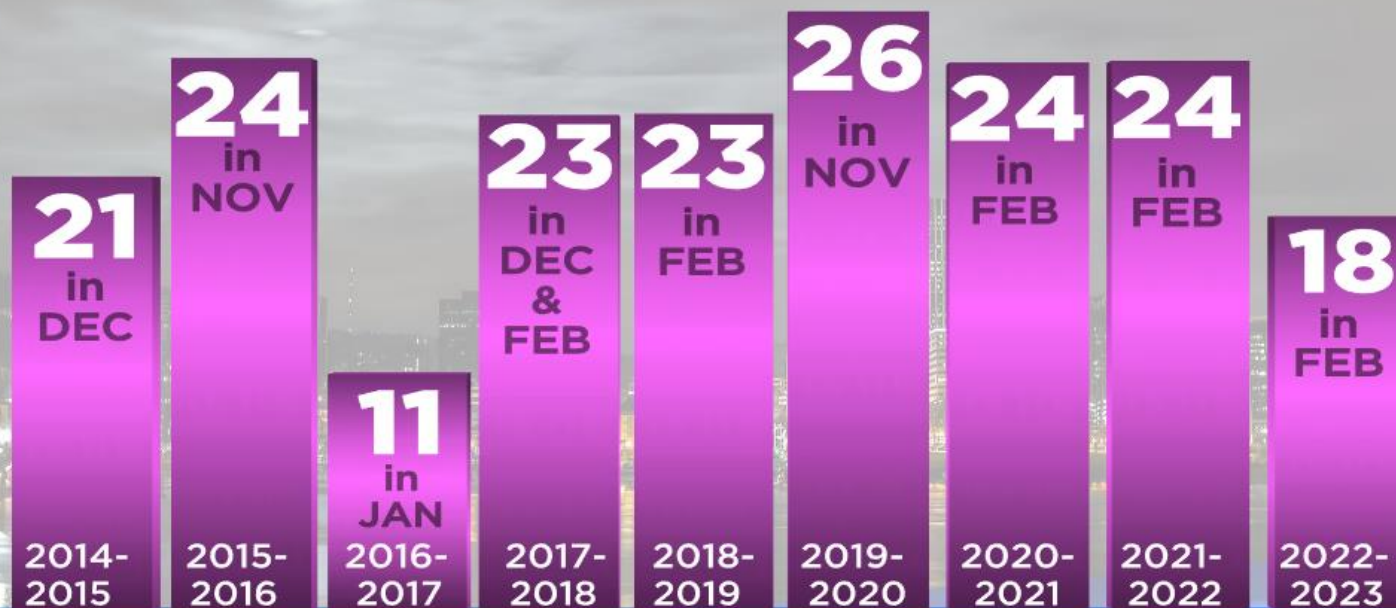
**Meadows** vs. **Gov't Camp** (in inches)





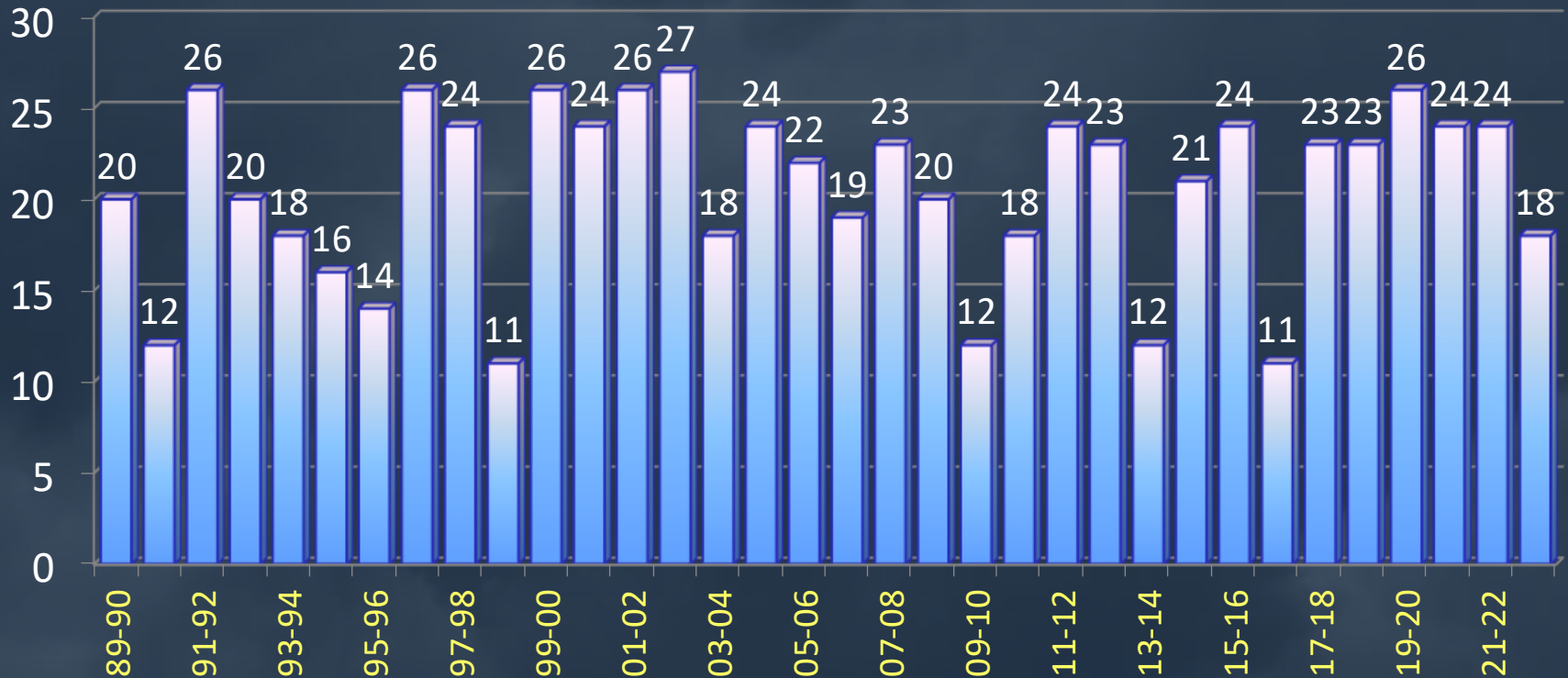
# **FIRST ALERT** COLDEST WINTER TEMPERATURE

IN PORTLAND



# Winter temps go easy on our gardens

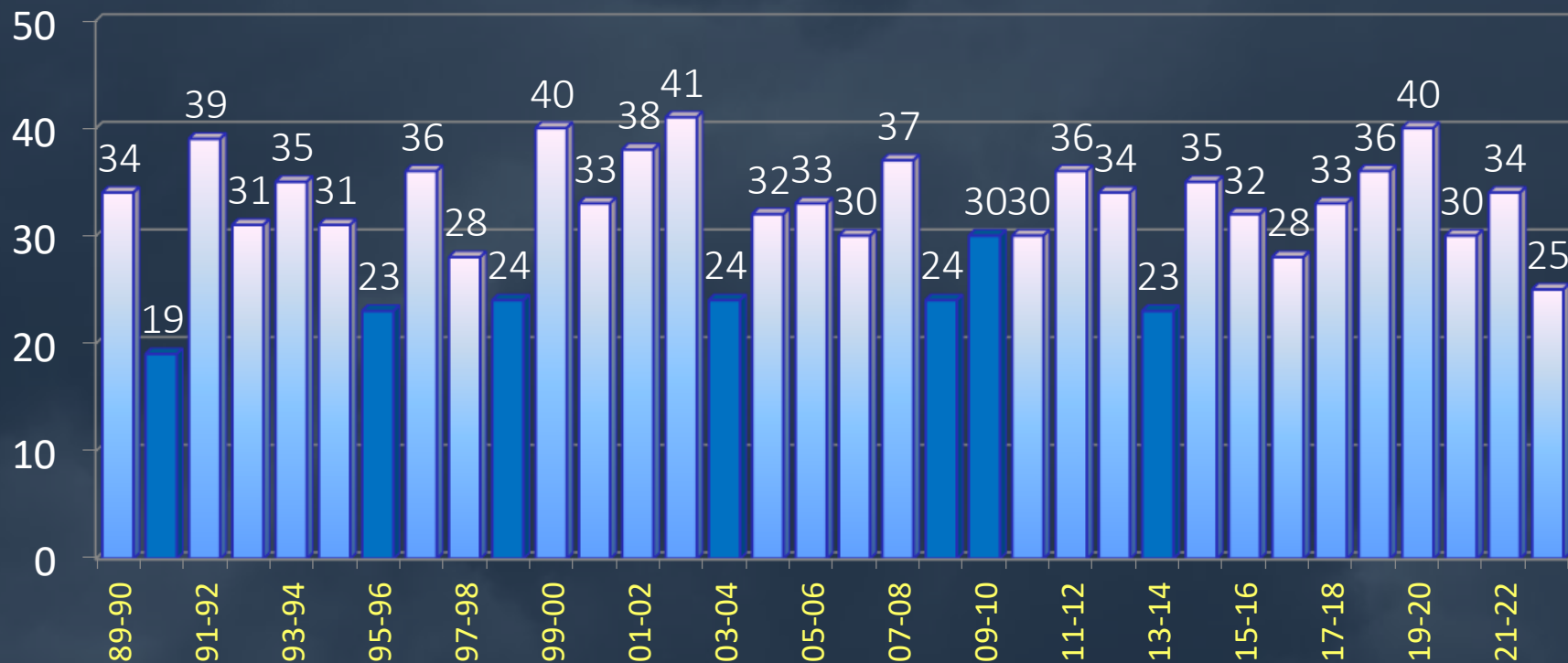
Winter Minimum Temperature @PDX





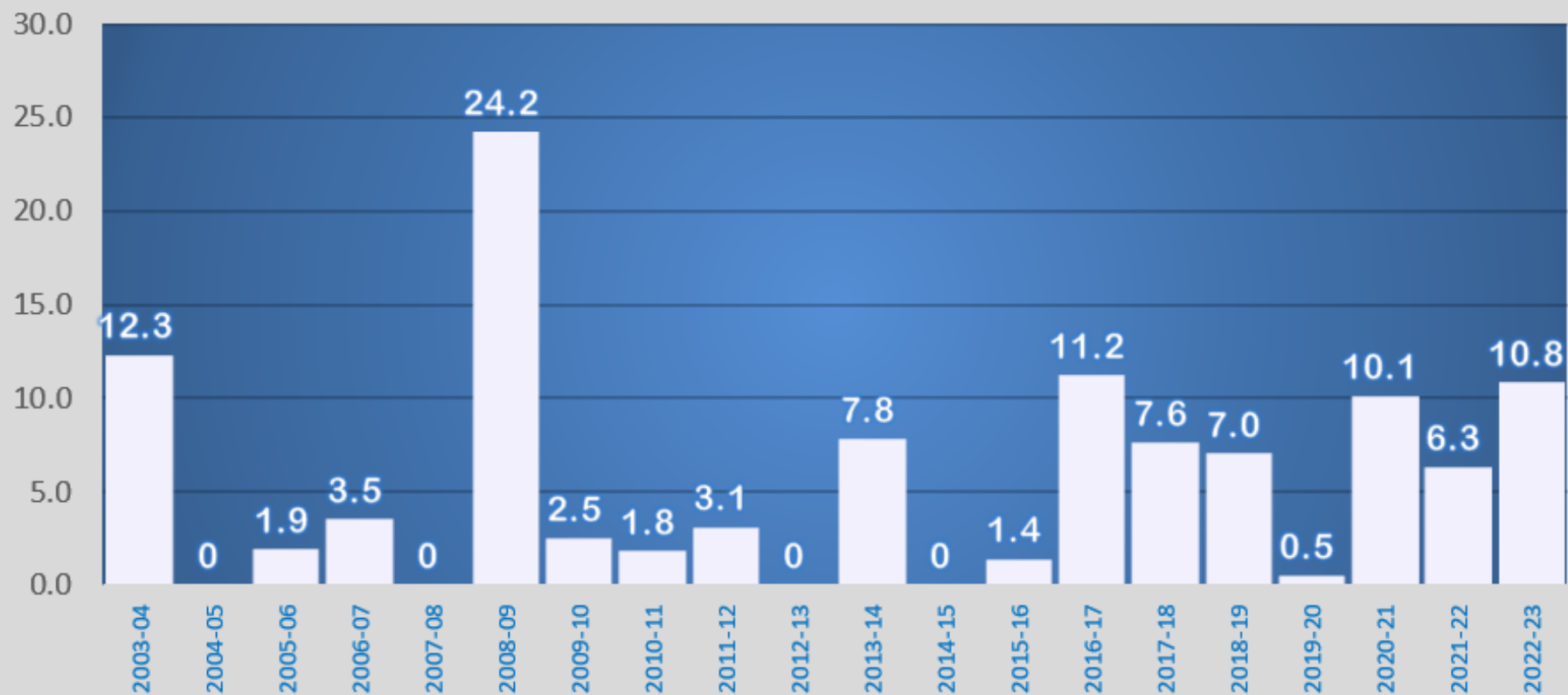
# A Better Measure of an Arctic Blast

## Coldest Daytime High at PDX



Blue = Widespread PACNW Arctic Air Outbreak

**PORTLAND (NWS-PARKROSE)**  
**SNOWFALL THE LAST 20 WINTERS** (inches)





# **FIRST ALERT** WINTER SNOW IN PORTLAND

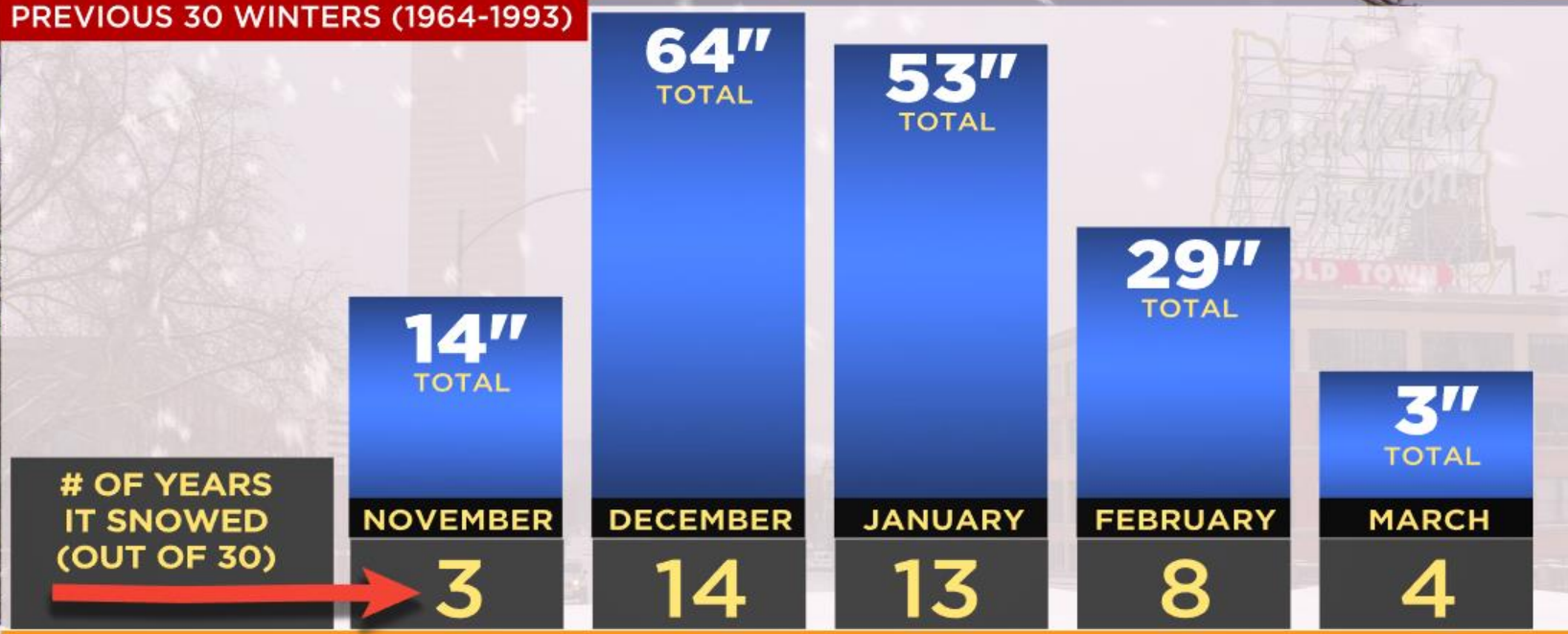
LAST 30 WINTERS (1994-2023)



**FIRST ALERT**

# WINTER SNOW IN PORTLAND

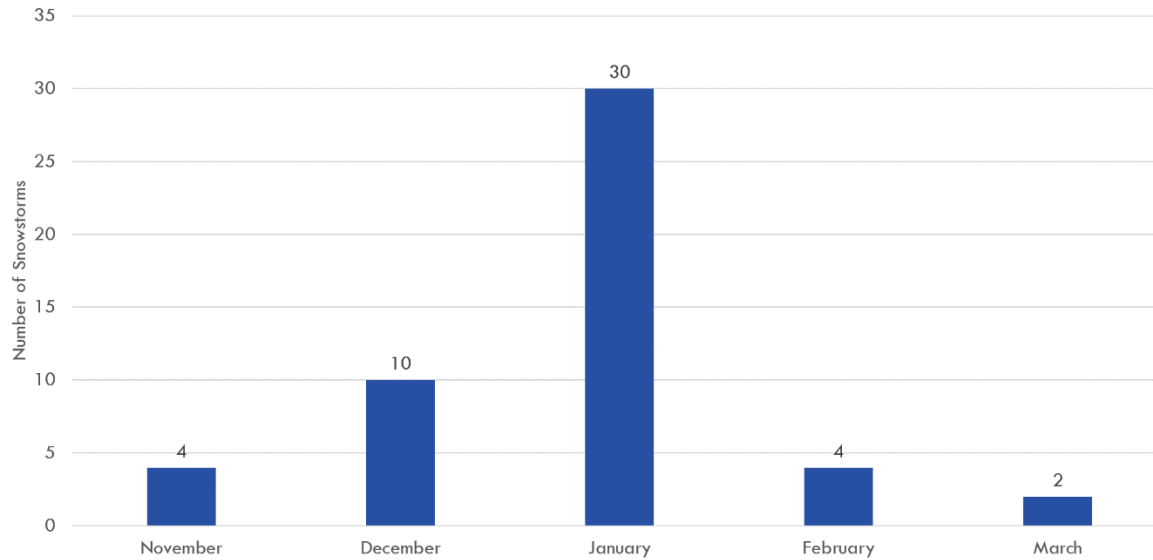
PREVIOUS 30 WINTERS (1964-1993)





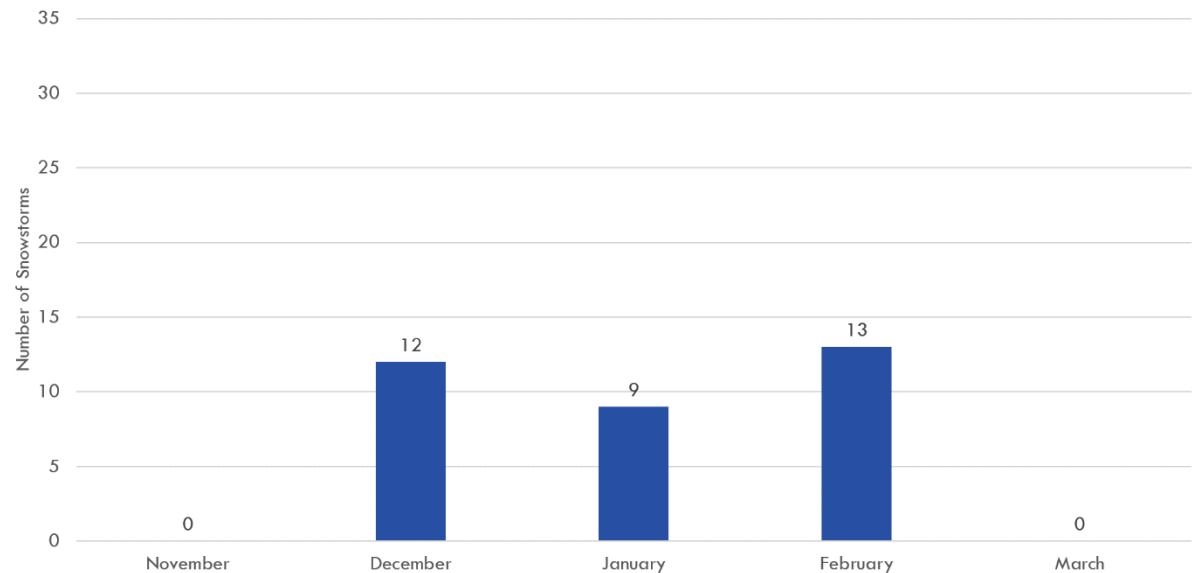
# Let's head over to "Tanisworld"

## Snowstorms Before 1981 (2" or more)



Info courtesy of  
Tanis Leach

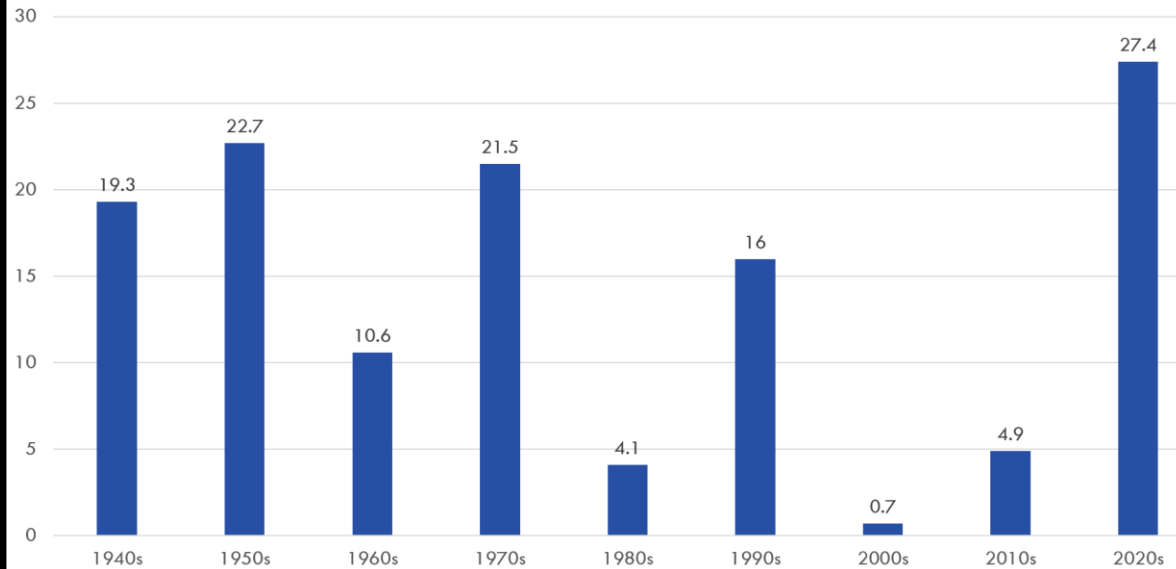
## Snowstorms After 1981 (2" or more)



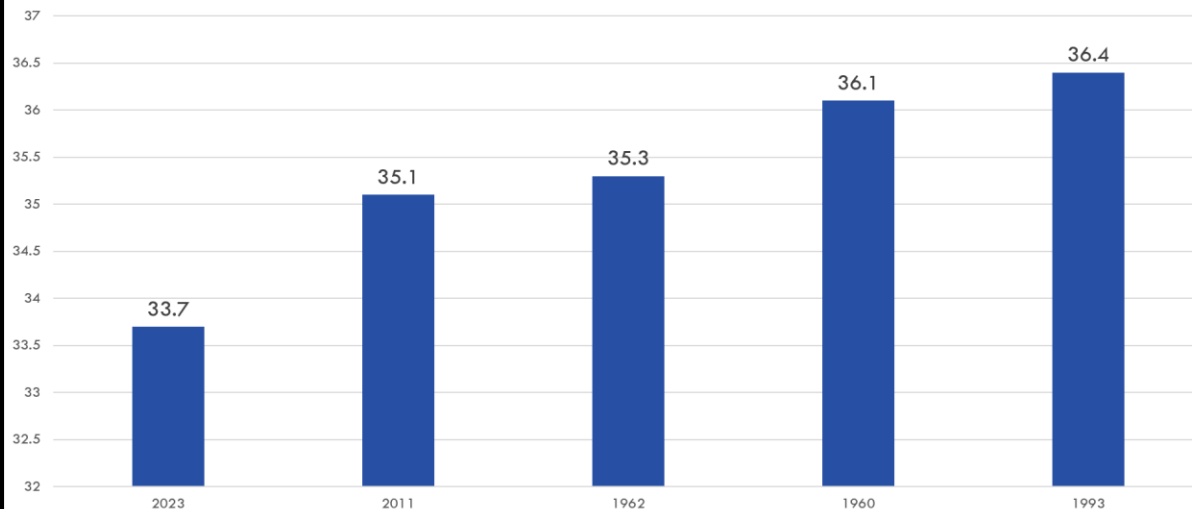
# Let's head over to "Tanisworld"

Info courtesy of  
Tanis Leach

Snowfall (Inches) in 1<sup>st</sup> 3 Winters Per Decade



Average Temperature (°F) Last Week of  
February (Feb 22-28)



Last week of February =  
coldest on record at PDX

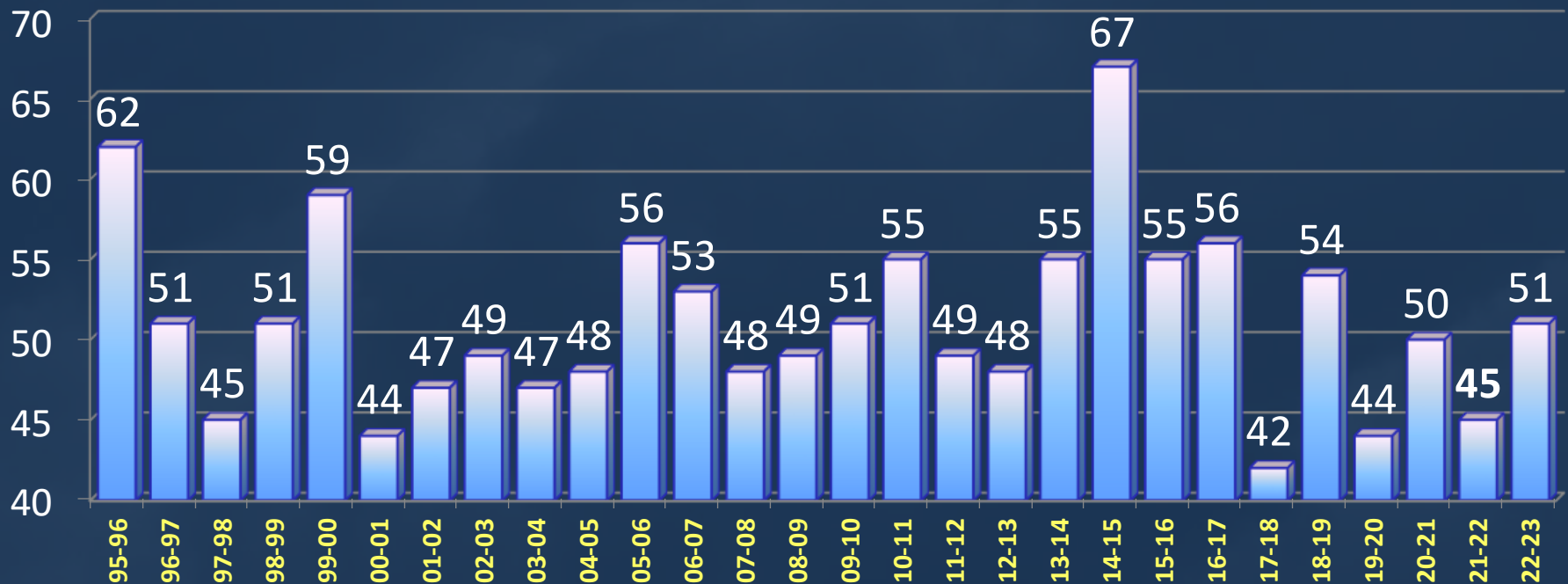


# NO INLAND WIND STORMS

27 winters without a major REGIONAL storm

## Yearly Peak Wind Gust at PDX in MPH

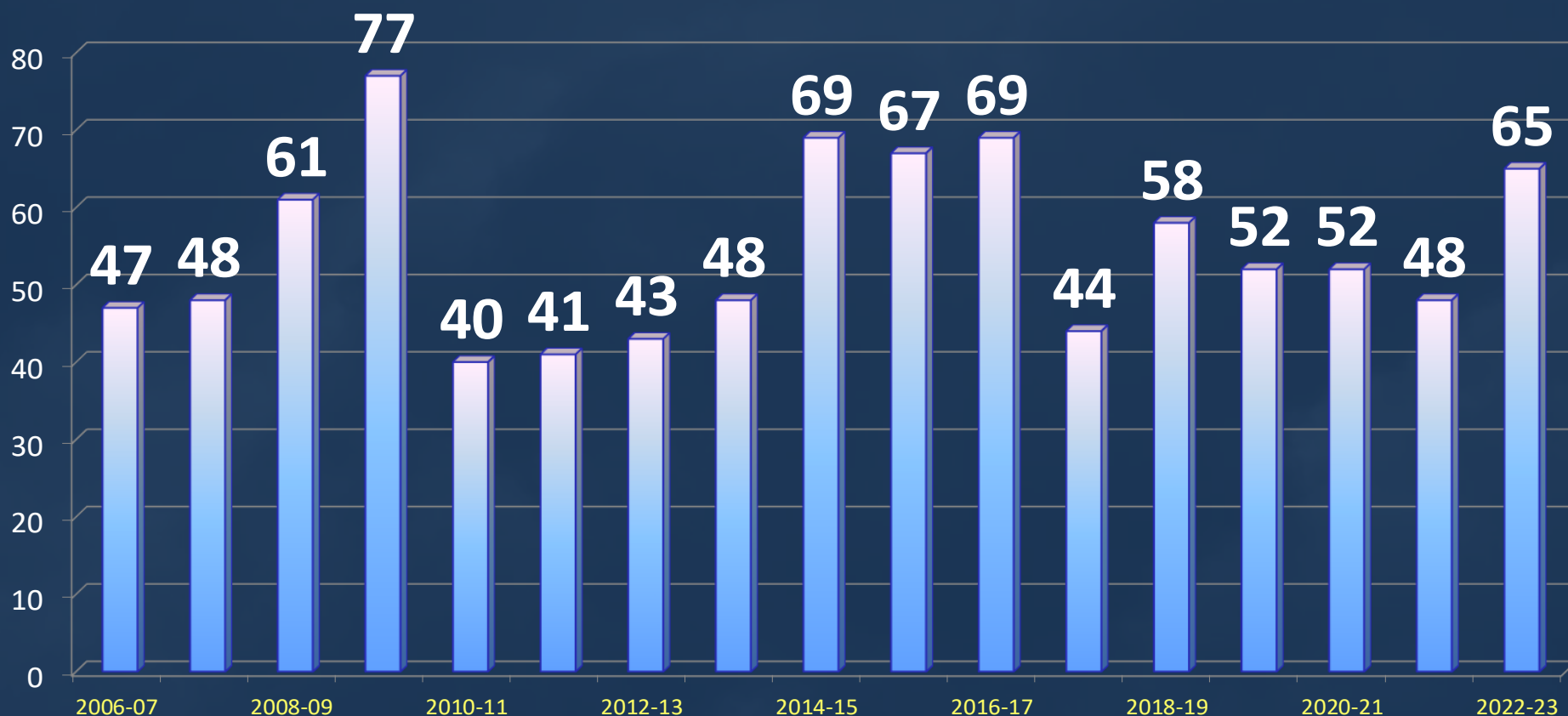
(Generally southerly)



# ROUGH EAST WIND SEASON

November + December = most “east wind days” since 2006!

Days with peak easterly gusts 25+ mph at Troutdale (Nov-Feb)





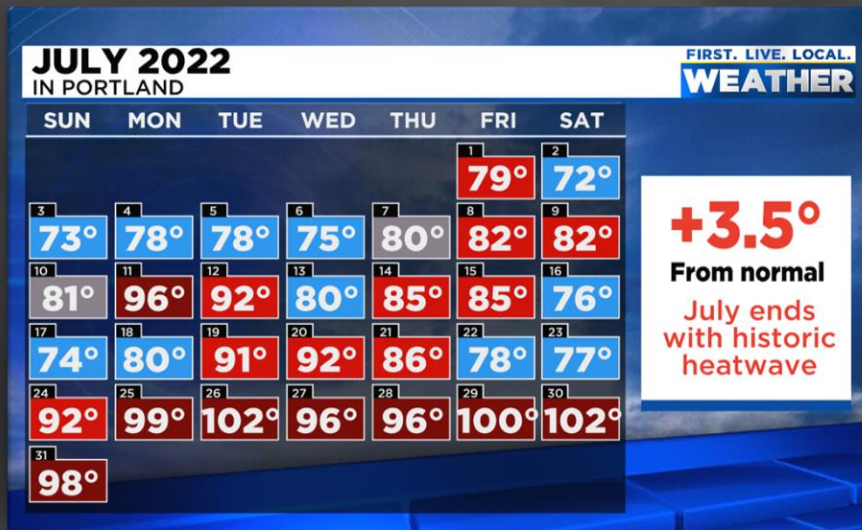
# FINAL WINTER THOUGHTS

- Models are great, but still have (fewer) issues mixing warmer air into easterly flow at end of cold spells/ice storms in metro area
- Silver Christmas was kind of fun...
- A lack of storms coming at us from westerly direction; few south wind events this year
- We are “due” for a snowless winter. El Nino on the way too?

# PRAY FOR A COOLER SUMMER!

#2022 was #3 hottest in Portland after 2021 & 2015

#3-Salem, #4-Eugene+Medford+Astoria, #2-Redmond



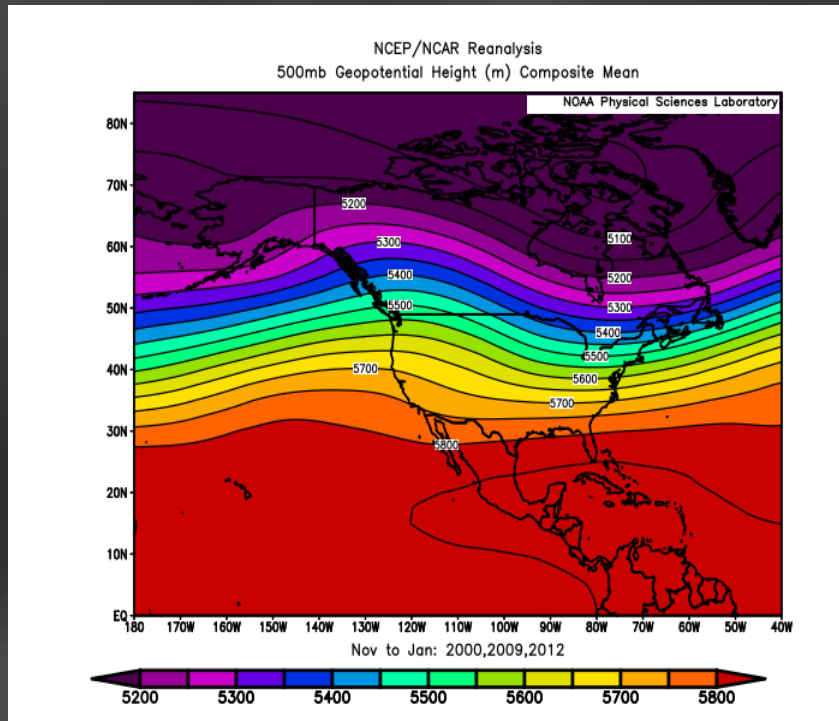


# COLLECTION OF WINTER OUTLOOKS

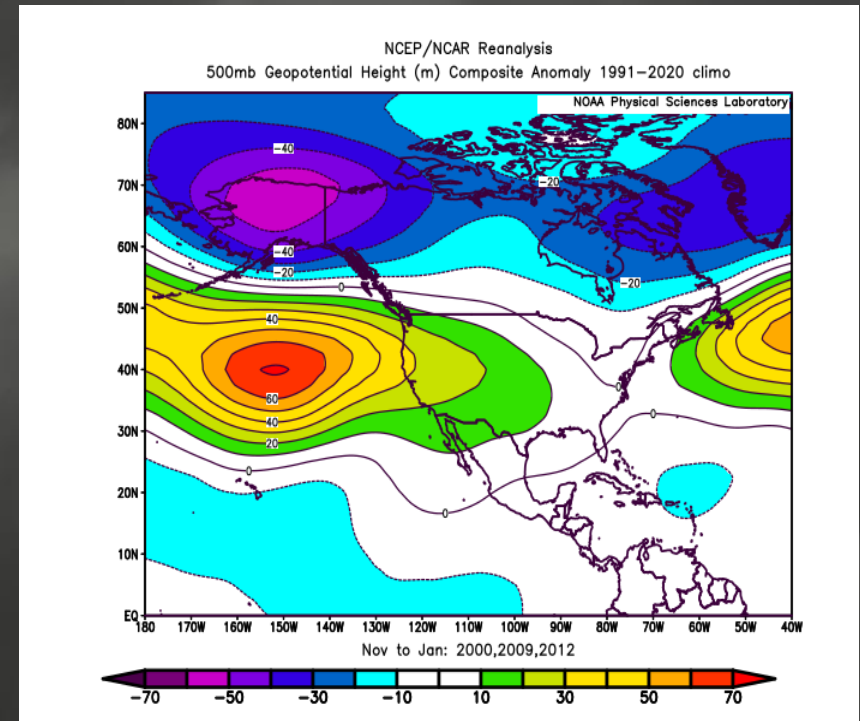
1. ~~Old Farmer's Almanac~~
2. ~~Farmers' Almanac~~
3. ~~AccuWeather~~
4. Pete Parsons – ODF
5. Models

# Pete Parson's Forecast Highlights

## Nov-Jan Mean Upper-Air Pattern



## Nov-Jan Upper-Air Anomalies















- Analogs all show a highly amplified pattern (typical of [La Niña](#)), with anomalous ridging centered somewhere in the eastern Pacific Ocean.
- This set-up has the potential to produce “extreme” weather events, which can skew monthly averages but “balance out” over 3 months.

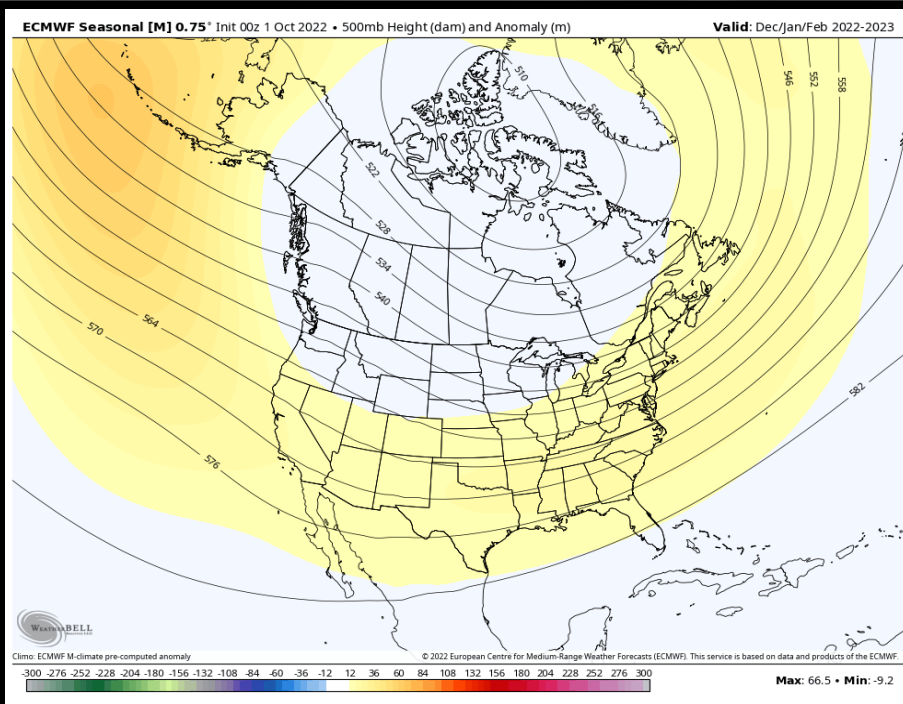


# Tanis Leach Forecast Verification

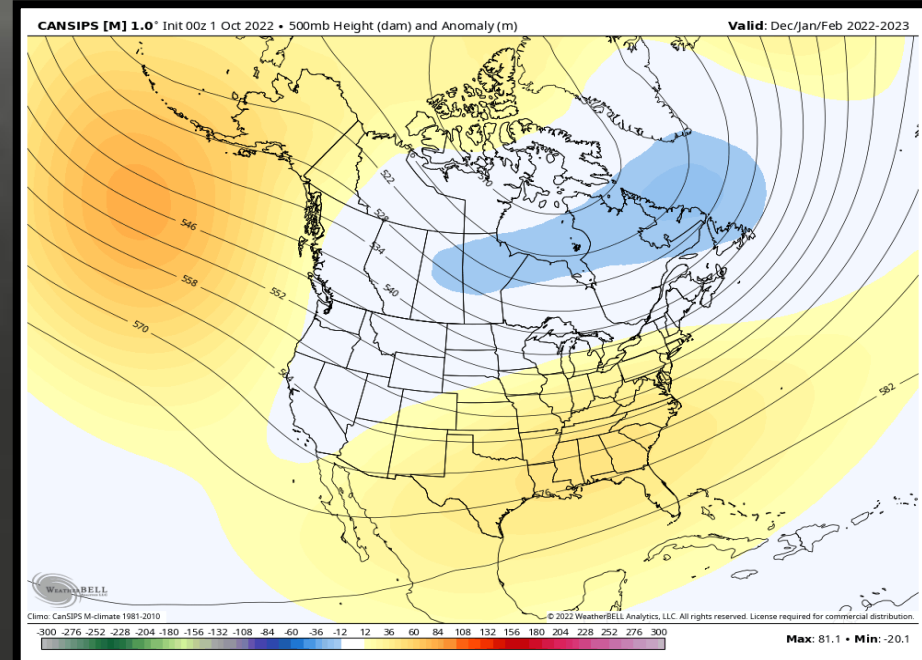
## 2022-23 Scorecard

Predictions	Actual/Projected	Oct	Dec
Water Year Rain: 28-38" December Update: 32-40" Both: Winter less than 14.97"	Winter Actual: 13.58 in. Water Year projected: 34.58 in.		
Average Temperature Departure: 2.5°F below average to 1°F above average Dec: 0-4°F below average	-1.2°F		
Lowest Winter Temperature: <20°F	18°F		
Peak Wind Gust: 45-55 mph	51 MPH		
Most Active Time: January 10 <sup>th</sup> -31 <sup>st</sup> (December update only)	Early November (Corvallis only), Late December, Late Feb	N/A	
April 1 <sup>st</sup> Snow Depth: 80-120% of normal December Update: 100-150% of normal	104% Basin, 91% at snowtel site. (As of March 1)		TBD
Valley Snowfall: 1-5 in. (2-8 in. Central/South Valley) December Update: 2-8 in entire valley.	Portland: 11 in. Eugene: 2.2 in. All Valley Average (Population Weighted): 7.72 inches		

# TWO MODEL FORECASTS



ECMWF DEC-FEB 500MB



CANSIPS DEC-FEB 500MB